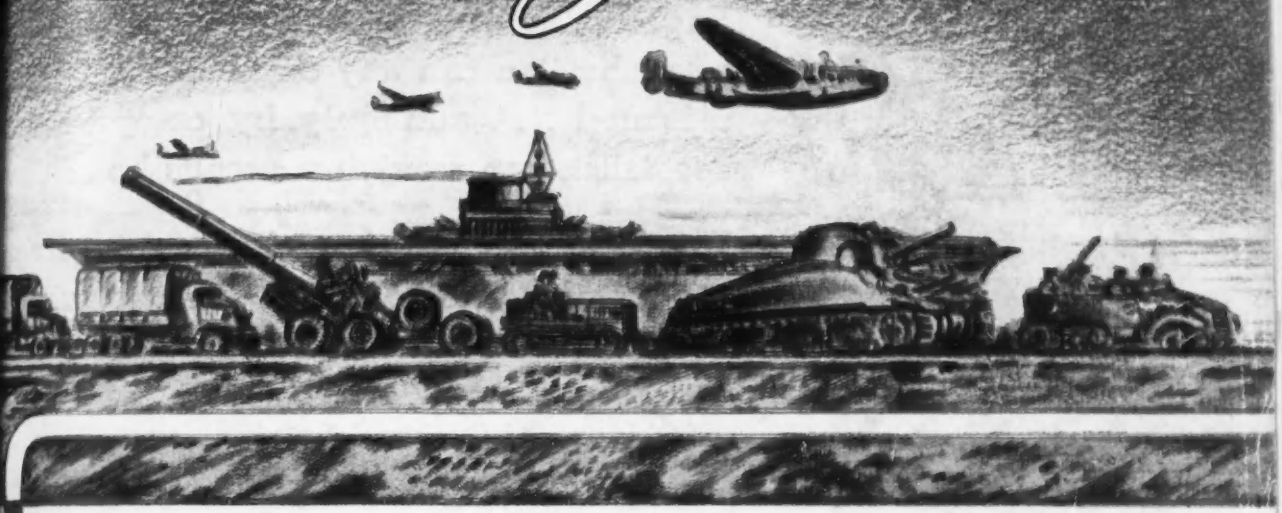
# S·A·E Journal



JANUARY 1945



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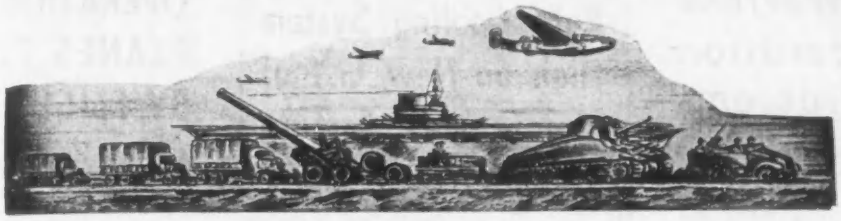
# SAE JOURNAL *Pre-Prints*





*News of the* **FEBRUARY** *Issue*

*Norman G. Shidle*

### *Selling An Idea*

THERE is no one best way to sell an idea—or to get information across. Lovers of standardization, engineers miss that point oftener than others.

Every occasion, every audience, every individual faced is a separate case.

Some people are good listeners, and will take an idea directly; others have to talk themselves into agreement or belief. Some listen with suspicion of self-interest to every proposal made; others accept ideas at face value until something happens to arouse suspicion. Some like to hear ideas, simply because they were born with mental curiosity; others are so absorbed in their own concerns that any outside idea becomes an intrusion.

Big Bill Tilden, greatest tennis champion of all time, studied his opponents—their styles, their weaknesses, their strengths. Then he changed his attack or defense to meet the particular requirements for winning. His success lay far more in his ability to adapt his game to the needs of the particular match, than in the much publicized power of his cannon-ball service or mere perfection of stroke production.

Trying to get ideas over in business, the average man will profit from studying *first* the man or group of men to be approached; then planning the presentation.

Only overwhelming power or perfection of delivery can overcome lack of awareness about the individual audience. Few business or professional men are that good.

## *Casting Techniques Aid War Production*

AMONG factors for increased war production, particularly of automotive equipment for the armed forces, have been tremendous gains in the output of castings and substantial improvement in the quality of cast parts. In fact the job now being done is so much bigger and better than any before possible, that war-developed casting techniques are regarded as likely to have extensive post-war influence.

Design for casting, plus improved methods of process control and inspection, and application of scientific methods in melting, casting, and heat-treating techniques, are producing better castings and are widening the field of potential utilization, it will be revealed in an article on casting progress, written by G. Vennerholm, of Ford Motor Co., to appear in February *SAE Journal*.

Mr. Vennerholm will express the opinion that many fabricated structures, now composed of a large number of assembled parts, eventually can be cast and that savings in time, money, and equipment will result.

## AIRCRAFT DESIGNERS SAVE TIME BY USING SIMPLIFIED FORMULA

AVERAGE life span of aircraft design engineers substantially has been extended by simplification of the Stodola formula for estimating stresses in disc wheels to the point of making it produce desired design data within a few minutes instead of the customary 45 hr.

The time-saving job of restating and rewriting the formula, and of designing a simple graph employing rectangular coordinates clearly indicating what happens when wheel dimensions are changed, will be described in February *SAE Journal* by its architect, William Knight, of Curtiss-Wright Corp., Propeller Division.

Those who like to pursue formulas to the bitter ends of mathematical results will find spread before them illustrative steps in the form of something like 32 equations which, correctly cleared, produce data capable of application to revelatory charts.

Mr. Knight also will explain what this new method means in the way of expediency and convenience in working out the proper proportions for the most efficient disc wheel design.

## AIRCRAFT ENGINES MAY BE INSTALLED IN LAND VEHICLES

ENGINEERING dividends from World War II are foreseen in the possible application of aircraft-engine practices to powerplants used in heavy-duty ground vehicles operating in the commercial field. Commercial operators are faced with the economic necessity for transporting maximum payloads over maximum distances at minimum costs. Engineers believe the aircraft engine's war-developed qualities of light weight, great power, good economy, and reliability are one solution.

Vincent C. Young, of Wilcox-Rich Division, Eaton Mfg. Co., will review the possibilities and engineering problems involved in February *SAE Journal*. He will point out that the economic difficulties of commercial motor vehicle operators are likely to be made more acute by increased post-war taxation of motor fuels, and that the high volumetric efficiency and low operating cost of the aircraft engine consequently will afford substantial advantages.

The job is more complicated than merely mounting an aircraft engine in a ground vehicle, Mr. Young will explain, and the path to ultimate success must lead step by step through a field of experimentation which probably will be strewn with failures. He will suggest that engineers designing and producing ground vehicles learn to think of higher power outputs at higher speed ranges, to make use of the high heat conductivity of some metals, and to study effective cooling methods.

## Oil Cooling Minimizes Ring Sticking Problem

ONE approach to solution of the problem of ring-sticking in diesel engines has been through control of piston temperatures by oil cooling. Theory is that if heat is kept away from the ring belt, the baking action on the lubricating oil, direct cause of ring-sticking, is minimized.

Progress so far made has suggested possibilities of freeing two-cycle, high-speed, high-output diesels from present operating handicaps, but has not solved all the problems involved. In February *SAE Journal* an article by Gregory Flynn, Jr., and Arthur F. Underwood, both of Research Laboratories Division, General Motors Corp., will review progress, report findings.

## Prolonged Wartime Vehicle Operation Creating Problems

MAINTENANCE of motor vehicles in wartime despite shortages of repairs, replacements, mechanics, and time has developed new concepts – first, of means and methods of servicing the vehicles and, second, of the tremendous mileages available from vehicles given proper care and attention.

Increasingly prevalent in the lore, language, and literature of motor vehicle servicing these days is the word "sludge." Reason is the increasing prevalence of sludge, both hot and cold, as a maintenance difficulty.

Sludging appears to be a difficulty which no panacea can cure, it will be explained in February *SAE Journal* by B. E. Sibley, of Continental Oil Co., who will report that sludge and related troubles at least can be minimized by using good quality oil, maintaining normal engine temperatures, installing effective oil filters and air cleaners, draining crankcases with properly frequent regularity while oil is hot.

Surveys of commercial motor vehicle fleets to be reported by Mr. Sibley will be said to indicate that improvements in the way of reduced sludge formation are obtained by using detergent-type lubricating oils. However, it will be reported additionally that even this constitutes no panacea and ultimate solution of the problem may involve engine design changes affecting oil passage ways and crankcase draining facilities.

## Wartime Experiences Replace Maintenance Theories With Facts

BYPRODUCT of extended wartime use of motor vehicles which cannot be replaced is the accumulation of operating experience and economic data which is supplementing and supplanting prior estimates. Where once fleet and maintenance engineers had well-substantiated theories, they now have the facts. Wartime shortages have proved whether driver training, preventive maintenance, mechanic training, overloading, and other factors are pertinent and, furthermore, just how influential they are in terms of dollars, cents, and service.

February *SAE Journal* will present an article by S. G. Page, of Equitable Automobile Co., summarizing cross-section experience in this field. Mr. Page, who will express the conviction that wartime experience will pay peacetime dividends, additionally will outline engineering evidence ranging from the way of a driver with an old truck to the advisability of truck manufacturers getting together and agreeing on standard forms for truck specifications and ratings.

Mr. Page's remarks will be interesting in still another way. They will present tangible evidence of the benefits provided for vehicle operators and fleet maintenance engineers by the recent reports and recommendations of SAE Transportation & Maintenance Engineering Activity.

## Rate Cooling System High on New List of Maintenance Factors

MOTOR Vehicle cooling systems, long neglected, are getting an astounding amount of attention lately, both from design engineers and fleet operators. Psychological reason for neglect appears to have been the inherent cheapness of the coolant, plus lack of understanding that an ineffective cooling system can cause serious damage to an engine. Psychological reason for elevation of cooling systems as subjects for engineering discussion evidently is conviction that the job of such systems really is temperature modulation rather than cooling, and that keeping an engine at an efficient operating temperature is a real responsibility.

D. H. Green, of National Carbon Co., Inc., will deal with the subject extensively in February *SAE Journal*, basing many of his conclusions upon findings in a survey of cooling-system troubles and the reasons therefor. He will recommend that preventive maintenance be made mandatory, and that consideration be given to cooling-system design for longevity of operation and ease of service.

## PROGRESS TOWARD UNIVERSAL FUELS PROMOTED BY WAR

WORLD War II's motorized armed forces, operating on a global scale and inclined to take direct action, evidently will go down in scientific and engineering history as comprising a potent factor influencing the development of a universal motor fuel. Prior to the war it was necessary to rely largely upon tailor-made fuels in operations which involved a wide variety of atmospheric, climatic, and related conditions. However, the use in global warfare of a tremendous number of different vehicles propelled on land, at sea, and in the air by internal-combustion engines created a fuel-supply problem of gigantic proportions and indicated the need of providing fuel which could be used by any vehicle anywhere, especially in emergencies.

Progress in developing such a universal fuel now can be reported only within the limits of military security, but a general idea of the work which has been done to date may be gained from an article by Walter G. Ainsley, of the Technical Division, Office Chief of Ordnance, to be published in February *SAE Journal*.

Mr. Ainsley's article will be concerned chiefly with the campaign against vapor lock, an inherent problem of motorized armed forces and, in view of the maximum variety and service requirements of equipment, one not easily solved. Mr. Ainsley will report what has been done in the way of changes in engines, vehicles, and fuels to assure reliability of performance regardless of types of terrain, climates, and combat conditions.

## OPERATION OF GIANT PLANES FACILITATED BY FLIGHT CONTROLS

AERONAUTICAL engineers increasingly annoyed by the speed and ease with which the wielder of an air brush can produce gigantic airliners, on paper, are inclined to point out that while aircraft of 150,000 lb, or more, can be designed and built, they still have to be equipped for operation by 150 lb, or less, people.

Their approach to the problem is to augment the strength of the operator by judicious application of power boost flight controls, yet even such means to a desirable end are bedeviled by the human limitations. Operators still want to experience "feel," just as ship captains once insisted that mechanical steering aids for large vessels tended to be unsafe because the "feel" of the rudder was lost to the helmsman.

Development of power boost flight control systems which will assure proper functioning of large aircraft, such as the Martin "Mars," yet will still give the pilot the "feel" of the controls, will be described in February *SAE Journal* by E. G. Riley, of The Glenn L. Martin Co.

Despite the size of the plane and the length of the control system, Mr. Riley will say, it has been found possible to build a mechanism so sensitive that moving control levers only 5/1000th in. initiates movement in the control surfaces.

## Shifting Tactics Force Changes In Aircraft Engines

THE fortunes of war, long regarded as classic examples of the vagaries of speculative enterprise, have taken a prominent place among the factors which engineers must consider in designing such essential equipment as aircraft engines.

Take the case of the Allison, reputedly the first American engine to pass the official Army Model Test at a rating of 1000 hp. Engineers were inclined to be critical of a supposedly inherent lack of design flexibility. Shortly thereafter simplicity, interchangeability, and flexibility became required attributes. Within three years after large-volume production began, 22 models were developed, with as many as seven going through in one day.

The technical story of changes in aircraft engines to meet the exigencies of war, with the Allison as the example, will be told in February *SAE Journal* by Dimitrius Gerdan, of Allison Division, General Motors Corp. It will not be the whole story, of course, but enough will be told to reveal the nature of evolutionary changes, from redesigning bolts and studs to splitting the engine into sections for purposes of more efficient production.

# S·A·E Journal

Published Monthly by The Society of Automotive Engineers, Inc.



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## JANUARY 1944

# THE PRESIDENT'S REPORT for 1944...

**by William S. James,**
**president,**
**Society of Automotive Engineers**

THIS annual report for 1944 highlights the record of a resultful year in the history of the Society of Automotive Engineers. Additionally, it constitutes an invitation SAE members to review the Society's recent accomplishents, and an opportunity for the retiring president, first, say that his pride in SAE has increased with his underanding of its possibilities, and second, to thank SAE Naonal and Sectional officers, committee chairmen and embers, and others who carried on the Society's work successfully in 1944.

Briefly, it may be reported that the Society's finances, embership, and activities are at new peaks. Its meetings, creasing in number, attendance, and effectiveness, are cilitating the dissemination of pertinent war engineering formation, and are encouraging advance consideration post-war needs. SAE Professional Activities are showg healthy growth and progress. SAE Sections and Groups gaining in numbers, in members, and in scope of acvities.

SAE is prosecuting a war engineering program which rendering outstanding service to appreciative military d civilian agencies of Government. This program already s reached the proportions of nearly 1400 essential projects. he Society's technical groups, implementing the warngineering program on multiple fronts with results which e contributing both to the nation's war effort and to tomotive progress, are becoming particularly well-

*turn to page 25*

## *"Thanks for a Grand Job!"*

I WISH that every one of our 12,000 members could have shared the thrilling experiences that have come to me this past year. I have seen our SAE teams "doing their stuff" in our Sections, Groups, Branches, and Committees from coast to coast. I have become personally acquainted with the many talented men who have created plus values, locally and nationaly. I have seen in action the officers, project leaders, committeemen, and members whom we have to thank for hundreds of SAE achievements, administrative and technical.

I have witnessed that continuing demonstration of human friendship, loyalty, and helpfulness that is SAE. *I have been sold all over again on SAE, its people, its accomplishments, its future!*

I wish that there were some way for me to say "well done and thanks" to each of you. Your individual contributions of talent, toil, and loyalty have made SAE's grand total grander. I can reach you SAE folks only through cold type, but I mean it, and warmly, when I say again, thanks for a grand job!

***—William S. James***

# 'COORDINATION' Keynotes Chicago SAE Meeting On AIR CARGO

Planners of the SAE National Air Cargo Meeting Dec. 4-6, in Chicago, and largely responsible for the success of the meeting, were members of the General Committee. Standing (left to right): William Littlewood, SAE Air Transport, vice-president; Wilfred W. Davies, general chairman. Seated (left to right): James T. Greenlee, chairman, Chicago Section, and SAE Aircraft Vice-President R. D. Kelly

BRIGHT prospects for the air cargo business of the future were highlighted at the third SAE National Air Cargo Meeting, Dec. 4-6, in Hotel Knickerbocker, Chicago, as nearly 800 designers and operations experts met in sessions sponsored by the SAE Chicago Section, under the auspices of the Aircraft and Air Transport Engineering Activities of the Society.

For the third time in three years, leaders of America's youngest, but burgeoning, transport industry met to report progress along the world's skyways. The keynote, repeatedly expressed by the eight chairmen, 22 speakers, and scores of discussers was: "Together, we design engineers and airline operators can make air cargo a big business."

Honor guests at the dinner included Mayor Edward J. Kelly of Chicago and important members and expert advisers of the International Civil Aviation Conference which was concluding its 38-day meeting with 54 nations represented. These special honor guests were SAE Past-President Edward P. Warner, vice-chairman, CAA; SAE Member William A. M. Burden, Commerce Department; L. Welch Pogue, chairman CAA; SAE Member Col. Harold R. Harris, chief of staff, Air Transport Command, and Com. Paul Ricker, USN. They were introduced by Toastmaster Wayne Parrish, publisher and editor of *American Aviation*. Mr. Parrish described highlights of his recent 27,000-mile air trip as a war correspondent.

SAE President W. S. James paid a stirring tribute to the 3228 engineers serving on the Society's extensive war advisory projects, and pointed out that few engineering advances are made by individuals but are mostly the product of coordinated ideas. "Just as standardization by SAE committees has been the key to mass production, coordinated research in the SAE will more quickly unlock tomorrow's aeronautical engineering problems," he said.

Past-President William B. Stout, director of Stout Research Division, Consolidated Vultee Aircraft Corp., called upon his engineering colleagues to exercise "imagineering" in dealing with all phases of aeronautical development. "Just as the Liberty engine was obsoleted at the end of World War I, today's aircraft engines, developed from commercial aircraft powerplants for this war, will be obsoleted the minute the war ends," he said.

The most optimistic predictions made today about post-war aeronautical achievements will generally fall short by about 90%, he said, describing the beginnings of a trend to "simplicate" designs. He cited the need for simpler and more functional small planes if this field is to achieve the hopes of its proponents. The speaker set 18-hr flight a day as a practical economic goal for designers.

Planning of the meeting was in the hands of the General Committee which, with W. W. Davies, United Air Lines Transport Corp. as chairman, consisted of J. T. Greenlee, Imperial Brass Mfg. Co., and chairman of the Chicago Section; R. D. Kelly, United Air Lines Transport Corp. and SAE vice-president for Aircraft Engineering, and William Littlewood, American Airlines, Inc., SAE vice-president of Air Transport Engineering Activity.

The Registration and Reception Committee was headed by G. C. Stephens; the Program Committee by Mr. Davies; the Publicity and Publications Committee by Robert Temple, and the Banquet Ticket Committee by Chicago Section's treasurer, W. H. Oldacre.

Throughout the three days design of aircraft, operations experience, and general aeronautical outlook were analyzed and synthesized. Prospects were appraised, and ingenuity was challenged in a spirit of camaraderie that connoted important achievements ahead of this airborne industry under the aegis of the Society. Designers offered their ideas of tomorrow for the assault of operators, some of whom did some designing on their own for good measure.

It was notable that no idle dreaming was done: Visions of tomorrow's air cargo were logical projections of pre-war and current experiences, with the tremendous war-boom expansion of air transport of today carefully accounted for and its excessive cost, as a military necessity, adequately discounted.

The conviction, *"together we can do* ... burned brightly, illuminating the ... drawings, and statistical tables, which ... up a constant flow of factual data ... out the meeting.

Operations highlights included ... tion of Navy data posing the question ... flying ships in the post-war era and a ... diction that converted surplus military ... could go far to reduce ton-mile rates if ... were favorably priced, but that air ... transport requires specially designed ... to make air freight transport a big ... of the future.

Three days before the third anniversary ... of Pearl Harbor, a colonel summarized ... achievements of the Air Transport Command, then not in existence. Reminding ... audience that he had called upon the ... at a Chicago meeting two years previous ... for all-out cooperation, he thanked his listeners and their colleagues for their important part in making the following ATC operations figures a fact:

160,000 route miles, with 2000 transport planes, operated by 150,000 personnel ...

uding 13,000 pilots, which daily transport
o passengers, 4 million letters, and 2000
ns of freight in 15,000 hr of flight, using
million gal of gasoline every 24 hr.

In what he called his "third annual report
the SAE," a Naval captain brought the
eeting up-to-date with an intimate picture
what the Naval Air Transport Service has
en doing to supply the Navy with men,
il, and supplies.

The expansion of the NATS, he said,
om a fleet of 15 aircraft in July, 1942, to
e of 200 aircraft a year later operated by
,500 personnel and covering 65,000 miles
world-wide airways, to a peak of 22,120,
0 ton miles, passenger miles upped to
,106,608, and cargo and mail ton miles
14,810,039 last September, is only a pre-
le to post-war air traffic possibilities.

The captain saw great possibilities for
th the Navy and commercial airline
erators in such craft as the Martin "Mars,"
e of which has recently completed its
st year of operation by the NATS. He
ve his audience this comparison of aver-
e flight time from San Francisco to Hono-
lu:

| | |
|---|---|
| Martin "Mars" | 13.8 hr |
| Douglas "Skymaster" | 12.2 hr |
| Consolidated "Coronada" | 14.3 hr |

Peering into the era of 1950 with the aid
economic trends as a background, two
rcraft design engineers saw a 50-fold ex-
nsion of air cargo business over present
vels by the full use of surplus cargo air-
anes. This was seen as a step toward
en greater expansion in the post-war pe-
od as aircraft manufacturers design and
ild commercial cargo planes to further
duce ton-mile rates.

It was shown that the economies coming
om establishing all-cargo service would
nd to develop about 10 times as much
rgo business as has been experienced in
e past with the pre-war passenger-cargo
C-3. However, operation of the specially
uipped surplus DC-3 cargo plane at 29,000
should develop about 250 times as much
siness as that of passenger-cargo DC-3
anes in the past.

Stated another way, it was shown that at
.6¢ per ton mile, cargo carriers would
quire 2100 planes in 1950, and that the
rlines would need to employ as many as
0,000 persons in cargo operations alone.
is compares with a total of only 750 per-
ns employed by 1950 if the rates remain
the present level—of about 59¢ per ton
ile.

Airline transportation's most vital prob-
m is saving ground time of aircraft, im-
portant operators indicated. This factor, en-
neers agreed, was most critical in short
ute operations and they dissected the
oblem and sought solutions in reporting
reful studies of the numerous reasons for
lay in loading and unloading at airline
rminals.

Typical of the challenge was a description
f details involved in converting passenger
anes to cargo carriers. Cargo bins had to
e changed from fixed compartments of wire
esh to openable gates of canvas webbing,
ghter lights in the bins with a skylight
ver the companionway were necessary, and
stalling wall linings of plastic impreg-
ated fiberglass was required to reduce dam-
ge and lessen the need for super-careful
andling.

A mechanical loading device was devel-
ped to eliminate the "bucket brigade"
ethod of loading through the DC-3 nose
or. This can also be used for loading and
nloading other types of aircraft. Another

**Principal dinner speaker at the SAE National Air Cargo Meeting, Chicago, Dec. 4-6, SAE Past-President William B. Stout (left) chats with Toastmaster Wayne Parrish, and SAE President W. S. James, who also spoke**

device was also built for handling smaller loads. Time saved reached 55% using the same personnel in tests.

An 18-point bill of particulars for aircraft designers was offered by one speaker as a "starting point" for engineers with initiative. To clinch his point he submitted to the meeting sketches of the "Alpha" and "Beta," aircraft employing the principle of the tractor-trailer truck combination. The trailer unit fits under the top section of the fuselage after it has been fully loaded and towed into mating position. Thus while the cargo section is being loaded at one point at the airport, the "tractor" section can be put into the hands of the maintenance crew for its periodic check and overhaul.

Despite extensive research into types of commodities that lend themselves to air transportation of the post-war era, engineers came up from the floor with cogent suggestions for consideration of operations engineers. Agreeing heartily with the operators on the principle of designing air freighters for freight and passenger airliners for passengers, design engineers demonstrated that they are keenly aware of the operators' problems. In some cases it was difficult for the audience to realize that the audience was divided, professionally, between operators and designers, so close were their conclusions. Agreement was quickly reached on such practical points as larger doors, freight bin rearrangements, and floors parallel to the ground instead of sloping, and powerplant and accessory considerations. However, with these disadvantages inherent in passenger planes converted to emergency cargo carriers, the converted equipment has pioneered the way toward a rosy future for air freight, it was pointed out by several other engineers.

Greater speed can come partly from more rapid descent of all-cargo planes at airports when passenger comfort need not be considered, and more rapid loading and unloading of the plane. Furthermore, such planes have been scheduled for 1:00 a.m. and 2:00 a.m. take-off, a period inconvenient for most passenger service.

Standard plywood floors are satisfactory, but one speaker suggested steel skid strips to facilitate sliding of cargoes into place.

A design engineer declared that with the savings of time in loading and unloading at terminals, ships of less power and speed would go far in reducing ton-mile rates and would open new vistas for the air cargo business of the post-war period when specialized airplanes can be designed and built for airline operators. One discussion stressed the analogy of trucks, railroad freight cars, and ocean freighters for cargoes, and automobiles, buses, Pullmans and coaches and ocean liners for passengers with the all-passenger and all-freight aircraft of tomorrow. Another added the idea of specialized air freighters for slower shipments, some of which might be of specialized design – such as in the trucking and railroad industries – for specific types of commodities.

Thus the shibboleth of passenger-and-cargo airplanes, which found numerous adherents three years ago at the first SAE Air Cargo Meeting in Chicago, lost ground again and again as current experiences showed clearly that greatest efficiency can be reached with specially designed cargo planes for freight.

Specifically, one speaker showed that a transcontinental operation of six planes converted to cargo service met better schedules and showed an important decrease in lapsed time as compared to sister ships carrying passengers or passenger-and-express loads.

Agreement was reached that little things such as tiedown devices, must not be overlooked in engineering cargo planes of tomorrow. Because lost time in loading and unloading and damage to cargoes may mean the whole difference between profit and loss, the importance of minutia was stressed time and again during the meeting.

Except under unusual circumstances heavy machinery will never be shipped by air, in

**Authors**

**who spoke on Design topics**

**DR. R. J. NEBESAR, Universal Moulded Products Corp., *"A Study on the Efficiencies of Cargo Airplane Design."***

**H. E. HOBEN, American Airlines, Inc., *"Cargo Plane Design from the Operator's Standpoint."***

**W. C. MENTZER and E. C. MITCHELL, United Air Lines, Inc., *"Cargo Tiedown and Stowage."***

**M. J. PARKS, Airplane Division, Curtiss-Wright Corp., *"Cargo Airplane Accessories."***

**HERB RAWDON, Beech Aircraft Corp., *"Requirements for the Feeder Line Airplane."***

**A. B. SCHULTZ, All American Aviation, Inc., *"Design Requirements for Pick-Up Aircraft."***

the opinion of some analysts. Shipments of complete mining equipment into the Andes, used as examples of machinery shipment, he pointed out, were in all respects emergency operations. However, sales of manufacturing and other machinery will be easier if the prospective customer knows that replacement and repair parts are available by air express, and that he can quickly get a damaged or worn machine back into production.

Elasticity of nylon rope was the idea that made cargo pick-up a reality and this development promises to bring air cargo service to factories, farms, mines, remote jungles, and heretofore inaccessible points in the post-war era, one of the sessions was told. Wounded soldiers have been safely "snatched" from combat zones and taken to base hospitals for care, material has been taken aboard transports from spots where no landing fields were available, and scores of other tactical uses are being tested daily, an engineer close to this phase of air cargo handling reported.

Looking into the future from the vantage point of his daily experience an engineer said: "Whole new industries may be created because of the speed, flexibility, and economy of this type of transportation." Delivery is made with or without a parachute, depending upon the character of the load, he added.

Greatest hazard to rapid development of air cargo is biased personal likes and dislikes which tend to blind able men from achievement, it was shown in several papers and discussions on design of the plane of the future and its accessories.

As one veteran of operations on two continents in the pre-war period, who has had global experience during the war, pointed out: "None of us is in a position to dictate commercial cargo airships at this stage of the game." This expert then went on to analyze some current practices in the light of their emergency character. Most of the lessons learned from military transport, a number of men agreed, is how *not* to do it.

In general, most of the seasoned engineers at the equipment discussions felt that the inevitable pendulum would swing back from super-duper accessory installations and that the post-war cargo carrier would be, as one discusser said, "more of a husky work horse and less of the bespangled, brewery-wagon Percheron."

In general, several design engineers agreed with operators that cargo planes of the future would require considerably less

**All papers presented at this SAE National Air Cargo Meeting will appear in a later issue of the *SAE Journal* either in full in the Transactions Section or as digests.**

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accessories than ships built for passenger service. It was pointed out by others that the greatest economy might well be found in smaller ships, by sacrificing some of the speed of the multi-engined ships now carrying the bulk of the supplies for the Armed Services.

An exhaustive survey of the type, density, and other characteristics of motor-vehicle-freight air cargo, and rail express shipments was reported by two airline engineers who are seeking an indication of air-cargo trends of the post-war period. Enough data have been collected from important shipping terminals to indicate that in the case of air cargo, as in truck and rail express, the study of shipments by commodities is unimportant, but the densities in lb per cu ft, individual shipment sizes, and individual shipping weights are all-important.

Eliminating war emergency shipments of materials and supplies, engineers were told that these three factors follow the same pattern in air cargo, truck transportation and railroad express. The discussion indicated considerable agreement that this would be the most logical pattern to expect in the post-war era—at least a guide until more commercial experience is available.

Long experience in materials handling installations for manufacturing plants and freight terminals was brought to the meeting by another engineer who urged consideration of mechanizing the loading and unloading problems of airlines. Although these operations, it was pointed out, are intermittent and involve handling of packages of fragile orchids and perishable fruit to bundles of tool steel and repair parts in transit, a great deal of continuous-flow materials handling experience is available for study by airline engineers. Where installations of the type described have been installed, large dividends in both time and money have been saved to truck, steamship, and rail operators, another report testified.

Many of the engineers who participated in the meeting agreed that the difference between profit and loss in future airline operations might well be found in keeping airplanes in the air for as many hours during the life of the equipment as possible. In accord with this point of view, an authority said that slow handling of passengers' baggage and cargoes has the same effect as reducing the airplane's speed by many miles per hour.

Engineers were again challenged by an airline operations official who pointed out that current designs of cargo airplanes are inadequate to tap the wealth of potential air-freight business in this country because of the high ton-mile rate that the equipment has to obtain and lack of rapid loading and unloading facilities of the planes.

Based upon cargo density studies of numerous potential types of air cargo merchandise, any large airline company could handle 1000 planeloads of freight a day with planes designed for cargo densities of something like 20 lb per cu ft, an audience at a symposium of the meeting was told. Planes now are designed for cargo densities of about 4 lb per sq ft, it was pointed out.

On the other hand, in the case of dresses shipped from New York to the West Coast containers were designed to permit hanging up frocks throughout the whole trip. This saved the cost of pressing at the destination and this cost made air transport attractive despite the low density of the shipment. In this case it was about 5 lb per sq ft, however.

Thus, again, design engineers and operators saw the problem of expansion of air cargo as a project to be solved only by continued coordination of ideas.

## Authors
### who spoke on Operations topics

**Col. HAROLD R. HARRIS, Army Air Forces, *"Air Transport Command Experiences."***

**Capt. C. H. SCHILDHAUER, U. S. Navy, *"Naval Air Transport Service Experiences."***

**CHARLES P. GRADDICK, United Air Lines Transport Corp., *"Transport Operation Experience With Cargo Airplanes."***

**CARLOS WOOD and A. B. CROSHERE, JR., Douglas Aircraft Co., Inc., *"A Proposal For the Establishment of Commercial Air Cargo Service."***

**JARED B. MORSE, Boeing Aircraft Co., *"The Relation of Cargo Handling to Air Terminal Services."***

**C. L. MOON, Mechanical Handling Systems, Inc., *"Cargo Handling Equipment Design."***

**H. S. PACK, Pennsylvania-Central Airlines, *"Saving Ground Time in Air Cargo Handling."***

**J. A. WOOTEN, American Airlines, Inc., *"Manufactured Goods Including Merchandise."***

**ALLEN DEAN, Detroit Board of Commerce, *"The Air Cargo Factor in Manufacturing."***

**A. W. FRENCH, Transcontinental & Western Air, Inc., *"Specialties in Air Cargo Shipments."***

**THOMAS WOLFE, Western Air Lines, Inc., *"Shipping by Air."***

Honored guests at the SAE National Air Cargo Meeting included Chicago's Mayor Edward Kelly (center), Col. Harold R. Harris, Chief of Staff, Air Transport Command (left), and Capt. Clarence E. Schildhauer, USNR, Naval Air Transport Service (right)

KC

# Air Transport Engineering Meeting

Among prominent members and guests at the speakers table were (left to right): H. B. Raynor, North American Aircraft Corp.; J. B. Rea, Consolidated Vultee Aircraft Corp.; Ray Young, Wright Aeronautical Corp.; Charles MacNeil, Aeroproducts Division, General Motors Corp. (Mr. MacNeil died of a heart attack en route home from this meeting; see p. 32); and James Clyne, Douglas Aircraft Co., Inc.

POWERPLANTS, air frames and helicopters of the present and future, maintenance of aircraft, airline operation and aircraft materials of the future, all received a large share of discussion at the Air Transport Engineering Meeting in Kansas City, Nov. 16-17. About 300 top-flight engineers of aircraft factories and airlines of the nation attended the convention sponsored by the Kansas City Section of the Society of Automotive Engineers.

Development of this strikingly successful meeting was in the hands of a General Committee, headed by F. M. Bondor as chairman; other members of the committee were E. F. Nason and H. R. Porter. Functioning under this General Committee were an Arrangements Committee, of which H. R. Berg was chairman; a Meetings Committee, of which A. E. Smith was chairman and Elmer Olson, co-chairman; a Publicity Committee, of which J. R. Kessler was chairman; a Reception Committee, of which D. S. Flynn was chairman; and a Financial Committee, of which W. H. Hooper was chairman.

At the powerplant session, presided over by J. C. Franklin, vice-president in charge of engineering of Transcontinental & Western Air, Inc., P. D. Doran, director of airlines engineering for Pratt & Whitney Aircraft, spoke of the factors affecting the selection of powerplants for modern transport aircraft. The late C. S. MacNeil, formerly chief engineer of the Aeroproducts Division of General Motors Corp., discussed propellers.

### Reconversion of Transports

The possibilities of converting military transport aircraft to passenger service was the topic of the discussion by James Clyne, executive assistant to the vice-president in charge of contract administration of Douglas Aircraft Co., Inc., at the afternoon airframe meeting on Nov. 16. Domestic airlines will require about three to four hundred more transport planes in the next several years, Mr. Clyne estimated. If the thousands of troop-carrier transport planes now in service are offered at a reasonable price and are in good mechanical condition, airlines can put some of them into use, and others will be junked or disposed of on a lend-lease basis, he predicted. But, the cost of reconversion of these planes, as well as of the Army cargo planes, will be high.

Mr. Clyne's talk was followed by a discussion of future aircraft material by G. H. Cartledge, chief of the Materials Research Laboratory of Curtiss-Wright's Airplane Division. Pointing out that big surpluses of magnesium and aluminum have been built up and that new forms of wood have been developed, Mr. Cartledge said there would be still other materials, not now used in aircraft manufacture, taking their place in the airframes of the future. C. W. Mentzer, chief engineer of United Air Lines, was chairman of the airframe meeting.

Cooperation between aircraft engineers of various manufacturing concerns for the furtherance of world air transport development was urged at the dinner meeting on Nov. 16 by SAE President William S. James, chief engineer of the Studebaker Corp.

About 300 persons were present at the dinner, which was opened by Kansas City Chairman Carl M. Berry. Mayor John B. Gage welcomed the engineers to Kansas City, and John A. C. Warner, secretary and general manager of the SAE, was toastmaster.

Following Mr. James' address, C. J. McCarthy, vice-president of United Aircraft Corp., spoke of the advancement made in air transportation since World War I and of the future strides implicit in recent powerplant developments such as jet propulsion and gas turbine engines. He pointed out that manufacturers, to fulfill this progress, must keep their organizations stable throughout the war and into the post-war period.

### Weather Menace Reduced

Howard Morgan, engineering director of Transcontinental & Western Air, Inc., recently returned from a trip to the war theaters, said at the operations meeting on Nov. 17 that weather is ceasing to be an operational hazard. Very high frequency radio communication, he said, indicates to the pilot a path along the ground and permits him to fly and land even at ceiling zero. It will be several years, he added, before commercial airlines can install such radio equipment and train their pilots to use it.

J. B. Rea, engineering test pilot for Consolidated Vultee Aircraft Corp., also spoke at the operations meeting, telling of the development of Consairways by his company, beginning as a war expedient to return pilots from the Pacific after they have delivered planes to the battle areas. At the present time, Mr. Rea said, the factory-operated transport line carries war materials and priority passengers over most of the world in its 16 planes.

### Simplicity of Design Asked

At the maintenance session, R. L. Anderson, superintendent of engineering for Chicago & Southern Airlines, spoke on the effect of airplane design on air transport maintenance, stating that reduction in the complexity of machinery greatly lessens the possibility of mechanical difficulty in flight. He urged that manufacturers put stress on simplicity and practicality in future designs.

*turn to p. 24*

C. J. McCarthy, vice-president, United Aircraft Corp., was the principal speaker at the dinner. His topic – "Aircraft Manufacture and Transportation"

# 1945 SAE WAR ENGINEERING-
## *and Engineering Display*

### MONDAY, JAN. 8

MORNING Transportation and Maintenance

**Cold Starting and Fleet Operation**
*– E. P. Gohn, Atlantic Refining Co.*

MORNING Passenger Car

**The Future of Standardization in the Automotive Industry**
*– J. H. Hunt, General Motors Corp.*

**The Future of Standardization in the Aeronautical Industry**
*– Arthur Nutt, Packard Motor Car Co., Toledo Division*

**Synthetic Rubber in Automotive Chassis – Status and Future Possibilities**
*– E. F. Riesing, Firestone Industrial Products Co.*

AFTERNOON Truck and Bus

**Alcohol-Water Injection**
*– A. T. Colwell, Thompson Products, Inc.*

AFTERNOON Materials

**SAE Rubber Classification and Its Uses**
*– W. J. McCortney, Chrysler Corp.*

**Wartime Fabric Developments of Significance to the Automotive Industry**
*– Morris Sanders, industrial consultant and architect*

EVENING Junior Student

*Auspices of Detroit Section*

**Wartime Science and Post-War Living**
*– Dr. Gerald Wendt, science editor, Time, Inc.*

**Technique for Practical High-Speed Motion Pictures**
*– Richard Painter and Paul Huber, General Motors Proving Ground*

EVENING Passenger-Car Body

**The Practical Post-War Car – A Symposium Based on Consumer Reaction to Present Automobile Bodies**
*– Reports from: Bert Pierce, New York Times; Herbert D. Wilson, Chicago Herald-American; Gordon Hebert, New Orleans Times-Picayune; and John Burke, San Francisco Examiner*

### TUESDAY, JAN. 9

MORNING Transportation and Maintenance

**Advantages of Multi-Powerplants in Motor Buses**
*– F. R. Fageol, Twin Coach Co.*

**Possibilities of Multiple Powerplants in Trucks**
*– Ralph Werner, United Parcel Service*

MORNING Aircraft Engine

*Symposium – Detonation Indicators*

**The Detection of Detonation and Other Operating Abnormalities in Aircraft Engines by Means of Special Instrumentation**
*– J. W. Streett, Wright Aeronautical Corp.*

**Detonation in Flight, Its Effect on Fuel Consumption and Engine Life (The "Sperry-Lockheed" used for these flight tests will be available for inspection – the time and place to be announced at the meeting)**
*– P. J. Costa, Sperry Gyroscope Co.*

**Detonation Indicating Equipment Used on the Allison Engine**
*– J. M. Whitmore and J. R. Burns, Allison Division, GMC*

AFTERNOON Truck and Bus

*– F. W. Davis, consulting engineer*

**Power Steering for Automotive Vehicles**

AFTERNOON Aircraft Engine

**Coordinated Engine Control Mechanisms**
*– John Dolza, Allison Division, GMC*

**The Primary Balancing of Radial Engines**
*– G. L. Williams and A. B. Miller, Pratt & Whitney Aircraft*

EVENING Business Session

*President W. S. James in the Chair*

**Nomination and Election of Members-at-Large of Annual Nominating Committee**

**Announcement of Election of Officers for 1945**

**Presentation of Committee Reports**

**Presentation of Life Membership**

EVENING Aircraft, Aircraft Engine and Air Transport

**International Aircraft Airworthiness Requirements**
*– Edward Warner, Civil Aeronautics Board*

EVENING Production

**Induction Heat-Treatment of Internal Surfaces as Applied to Automotive Industries**
*– H. E. Somes, Budd Induction Heating, Inc.*

**Tocco Hardening**
*– H. B. Osborn, Jr., Tocco Division, Ohio Crankshaft Co.*

### WEDNESDAY, JAN. 10

MORNING Passenger Car

**Difficulties of Long-Time Ownership of Passenger Cars**
*– John Oswald, General Motors Corp.*

MORNING Aircraft

**Basic Factors of Helicopter Design**
*– R. H. Prewitt, Kellett Aircraft Corp.*

**Application of Aero-Economic Factors to Specific Aircraft Design**
*– J. B. Kendrick, Lockheed Aircraft Corp.*

AFTERNOON Materials

**Metallurgy of Enemy Automotive Materiel**
*– Col. J. H. Frye, Office of the Chief of Ordnance*

**Some Cases for Steel as a Material**
*– E. P. Strothman, A. O. Smith Corp.*

# ANNUAL MEETING JAN. 8-12

## BOOK-CADILLAC HOTEL, DETROIT

AFTERNOON Aircraft Engine

**Flow Characteristics of Induction Systems**
*–A. P. Fraas, Packard Motor Car Co.*

**Some Possibilities of Turbine Compounding with the Piston Engine**
*–C. F. Bachle, Continental Aviation & Engineering Corp.*

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SAE WAR ENGINEERING DINNER

EVENING 6:30 P.M.

(Limited to SAE members and applicants)

**R. N. DuBois, chairman, SAE Detroit Section**

**Eugene E. Wilson, vice-chairman, United Aircraft Corp., Toastmaster**

**W. S. James, President SAE**

**J. M. Crawford, President-Elect**

**Presentation of Daniel Guggenheim Medal for 1944 for achievement in aeronautics to:**
*Lawrence D. Bell, president, Bell Aircraft Corp., by William Littlewood, SAE representative, Daniel Guggenheim Board of Award*

**Steps Up in the Development of an Air Force**

BRIG.-GEN. FRANKLIN O. CARROLL

Chief, Engineering Division, Air Technical Service Command

★ ★ ★ ★

## THURSDAY, JAN. 11

MORNING

Fuels and Lubricants

**Universal Gear Lubricants**
*–P. V. Keyser, Jr., Socony-Vacuum Oil Co., Inc.*

**Engine Oil Foaming**
*–H. A. Ambrose and C. E. Trautman, Gulf Research & Development Co.*

**L-4 Oxidation Engine Test**
*–B. E. Sibley, Continental Oil Co.*

MORNING Aircraft

**Report on Development and Application of Heated Wings**
*–Lt. Myron Tribus, Equipment Laboratory, Air Technical Service Command*

**Some Experiences with Low-Drag Airfoils**
*–E. J. Horkey, North American Aviation, Inc.*

AFTERNOON

Fuels and Lubricants

**Fuels and Engines for Higher Power and Better Efficiency**
*–C. F. Kettering, General Motors Research Laboratories Division*

AFTERNOON Aircraft

**Electronic Controls in Aircraft**
*–Lt. R. J. Colin, Jr., Equipment Laboratory, Engineering Division, Air Technical Service Command*

**Electronic Analysis of Airplane Hydraulic Braking Systems**
*–Duncan Gardiner, Vickers, Inc.*

EVENING

Aircraft and Air Transport

***Symposium – Cockpit Engineering***

**Aircraft Lighting**
*–Major A. D. Dircksen, Air Technical Service Command*

**Psychological and Physiological Aspects of Cockpit Engineering from the Pilot's Viewpoint**
*–Dr. R. A. McFarland, Division of Research, Graduate School of Business Administration, Harvard University*

**Control Cabin Development**
*–K. F. Gordon, Boeing Aircraft Co.*

**Making the Cockpit Practical for the Pilot**
*–G. F. Beal, Northwest Airlines, Inc.*

EVENING Passenger Car

**Contributions of Industry to Ordnance Tank-Automotive Engineering**
*–Col. Joseph M. Colby, Office of the Chief of Ordnance*

## FRIDAY, JAN. 12

MORNING Diesel Engine

**Methods for Calculating Torsional Vibration**
*–F. P. Porter, Fairbanks, Morse & Co.*
*Prepared discussion by W. W. Henning, International Harvester Co.*

**Bonded Rubber Torsional Vibration Dampers for Diesel Engines**
*–T. H. Peirce, H. A. King Co.*
*Prepared discussion by Dr. J. J. Wydler, National Supply Co.*

MORNING Air Transport

**Symposium – Defining the Market for Aircraft for Local Air Transport Service**
*Speakers: W. B. Stout, Stout Research Division, Consolidated Vultee Aircraft Corp.; H. E. Nourse, United Air Lines; Hon. L. Welch Pogue, Civil Aeronautics Board; and Com. J. J. Bergen, USNR*

AFTERNOON Diesel Engine

**Piston Development Review**
*–E. T. Vincent, University of Michigan*

**Piston Lacquering, Its Causes and Cure**
*–H. C. Mougey, Research Laboratories Division, GMC*
*Prepared discussion by J. C. Geniesse, Atlantic Refining Co.*

AFTERNOON Air Transport

**Symposium – Airport Design**

**Airports as Affected by Aircraft Performance and Weight**
*–Arthur Ayres, Pan American Airways, Inc.*

**Trends in Airport Runway Design**
*–Paul Stafford, Civil Aeronautics Administration*

EVENING Standards

***Joint Session – ASME Detroit Section and SAE***

**Drawing Office Practice in Relation to Interchangeable Components**
*–C. R. Gladman, National Physical Laboratory, England*

Active at the meeting were (left to right): Carl M. Berry chairman of the Kansas City Section; D. S. Flynn, Kansas City Section past-chairman and chairman of the Reception Committee, and H. R. Berg, chairman of the Arrangements Committee

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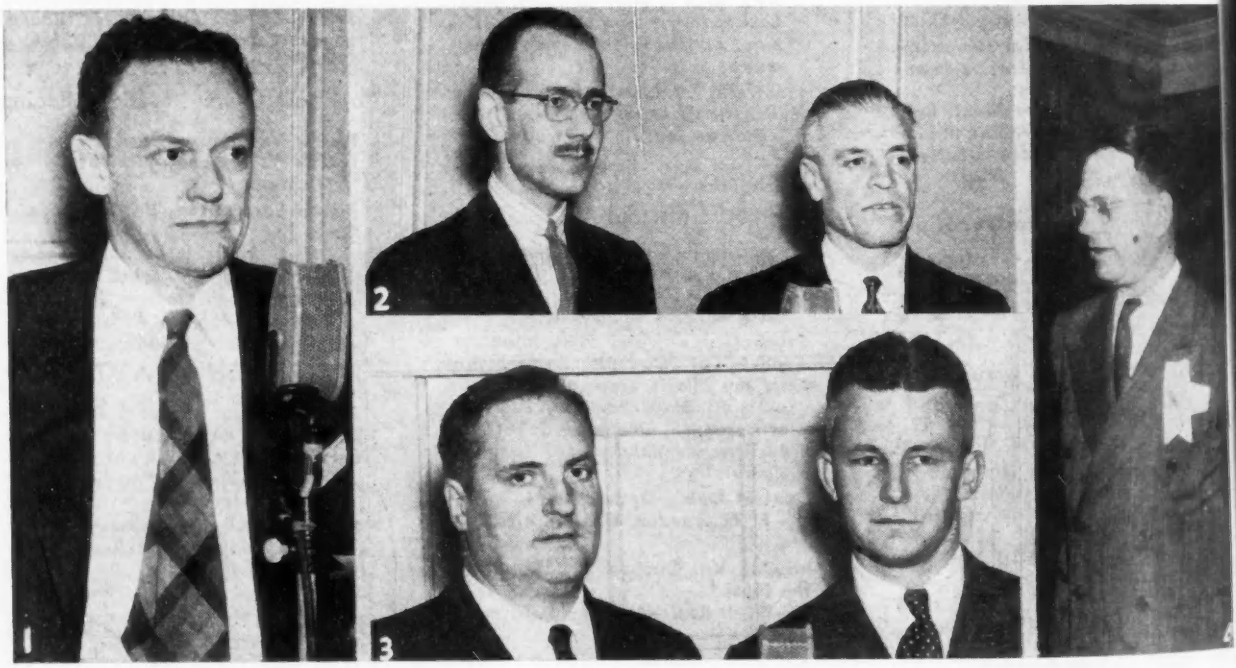
Another feature of the maintenance session was a paper prepared by the engineering staff of TWA describing their use of fluorescent control panel numerals and markings to improve pilot vision. The report was read by John R. Griffin, Jr., head of TWA's powerplant group.

### Helicopter's Future Assured

A special feature of the final meeting was a talk on the future of the helicopter by Laurence LePage, president of the Platt-LePage Aircraft Co. Contrary to popular opinion, Mr. LePage said, as much skill is required to operate a helicopter as a plane. This fact, combined with the cost and maintenance features, makes the post-war helicopter-in-every-garage plan an improbability. LePage said, however, that the commercial future of the helicopter is assured. He predicted twin-engined, 14-passenger commercial helicopters with a speed of 150 miles for use shortly after the war. In the very near future, he said, helicopters will be in use to taxi between downtown terminals and city airports. The helicopters of the future will operate up to 15,000 or 20,000 ft., or to 30,000 ft., with supercharged powerplants, Mr. LePage concluded.

Many displays in the meeting room commanded attention. T & W A furnished an operating model of the hydraulic system used on the DC-3, and automatic pilot, direction-finding equipment and cutaways of Hamilton Standard propeller and a Wright engine. The Curtiss-Wright operating displays of their electric propeller and the new multiple engine synchronizer proved to be a gathering spot. Andover Motors displayed their new auxiliary power unit and the cutaways of the Vickers pumps received high interest.

# AMONG THOSE WHO PARTICIPATED at KC MEETING



1. W. C. Mentzer, chief engineer, United Airlines, chairmanned the Airframe Session

2. W. L. LePage, president of Platt-LePage Aircraft Co. (left), who spoke on helicopter developments, and M. G. Beard, director of flight engineering, American Airlines, who chairmanned the Maintenance Session

3. P. D. Doran, director of airlines engineering, Pratt & Whitney Aircraft (left), speaker, and J. C. Franklin, vice-president, Transcontinental & Western Air Lines, chairman of the Powerplants Session

4. Harold R. Porter, senior engineer, Transcontinental & Western Air Lines, Inc., member of the General Committee

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ounded organizationally. The success with which the ociety is serving the military is attested by the new Ordance Distinguished Service Award, the first ever conerred. Further, growing confidence in the achievements f SAE is demonstrated by the Army, Navy, Air Force, nd civilian agencies, which repeatedly are calling upon he Society to undertake additional projects in automotive ngineering.

During the past year the SAE Post-War Advisory Committee, at the SAE Council's request, initiated the basic nd broadly helpful work of surveying the structure, methds, and accomplishments of SAE preliminary to streamlining the Society for important post-war jobs. The Committee's plans and recommendations are being geared to normal processes of evolution, with special provisions to ssure smooth transition from wartime to post-war conditions.

Consideration is being given to the development of a peacetime program of engineering service to perpetuate he cooperative spirit which has marked SAE relationships with industry during the war years. This program should enable SAE not only to continue its patriotic service to Government military and civilian agencies, but, simultaneously, to engage in cooperative and coordinated engineering projects of direct interest and benefit to industry.

Potential growth of SAE in membership and in scope of activities is presaged by the increasing interest in SAE work shown by individuals and companies from related branches of the American automotive industry. This interest becomes especially noticeable as SAE projects and meetings tend to develop better and fuller engineering understanding of materials and design, production and utilization.

This overall view of SAE enterprises, while brief, is sufficiently broad to suggest that any complete report of accomplishments, even for so short a period as one year, would border upon the voluminous. Since this is a war year in which much must be done in little time, the retiring president exercises the privilege of condensing this review of the Society's accomplishments into far less space than their importance justifies.

Any pattern of editorial condensation could arouse suspicions of partiality, so it should be explained that SAE undertakings herein specifically mentioned constitute merely a few which being of general interest and of obvious service, may be classified as typical. The same reasoning, however unsatisfactory, underlies the editorial briefing of other chapters of SAE's 1944 history.

## Record Income, Promising Future, Brighten Finances

Financially, the Society now presents the brightest picture since its organization. Regular income is at a record high. The third SAE War Chest is successful. Many participants have made oral and written statements of commendation.

Plans now are being developed to broaden the base of SAE income so as to meet the costs of carrying on a practical peacetime program of Government-Industry cooperation in the field of automotive engineering. Such support is necessary if this program is to be financed without encroaching upon services to SAE members.

By far the largest single factor in the Society's present income is advertising. Paper shortages and restrictive quotas already are curbing the further growth of this income, and may force the Society to curtail advertising space in *SAE Journal* in order to satisfy growing editorial demands.

With security as the major objective, SAE investment funds have been kept intact through the hazardous years The yield naturally is small.

Generally speaking, the Society's financial position and outlook are such as to assure SAE members, possibly in greater measure than ever before, of services which cost substantially more than income from dues alone can justify. Except for curtailments necessitated by wartime regulations, no reversal of the current trend is foreseen.

The annual financial report, is appended. Accounting practices have been revised to permit better control of expenditures and more efficient overall operation. This action, approved alike by the SAE Finance Committee, auditors, and attorneys, will provide accounting machinery for gearing expenses to fluctuations in income so as best to meet changing needs. Advance planning now under way promises to obviate any unconsidered decisions or hasty action in future periods of readjustment.

In line with good business practice, the Society is inaugurating a contributory retirement plan for employees. The benefits are not as generous as many think advisable. It is hoped that future conditions and continued improvement in the Society's financial position will warrant upward revision.

## War Engineering Expands SAE's Technical Program

Wartime acceleration and expansion of production facilities, processes, and equipment in industry in 1944 were reflected in the development by SAE General Standards Committee of numerous projects of direct aid to industry.

Activities, particularly of the SAE Aeronautics Division, were extended to meet growing military requirements and to aid industry in stepping up production operations accordingly. Above and beyond the routine standards program of the Division, new committees were created for special undertakings, such as reviewing and preparing recommended revisions of Government aeronautical standards and specifications so as properly to reconcile the objectives of the military and the production facilities of industry.

The SAE provides machinery which the Government can and does use to get orderly review of proposed Government aeronautical standards and specifications by the engineers of the industry. By coordinating opinions and by establishing practicable working bases in advance, tremendous savings in time and expense are assured. Both producer and user, through participation in this work, obtain greater satisfaction.

SAE has set up two committees to review all A-N standards from 1 to 1000 – this series including all standard parts for hardware. As a result of this review, a much wider use of A-N standards by engine manufacturers is anticipated.

Direct request by Government resulted in establishing two new committees in the Accessory and Equipment Sub-

division. One has accepted responsibility for coordinating the activities of NASC, NEMA, and AIEE in standardizing aircraft electrical equipment, devising standard test procedures, and preparing specifications for manufacturing and testing the equipment. The other committee is authorized to coordinate the work of accessory and equipment manufacturers in the preservation and packaging of aeronautical accessories.

A Propeller Subdivision committee has completed standards for single- and dual-rotation propeller shaft ends. The data have been used virtually unchanged by the armed services in writing Government specifications.

Outstanding because of its influence, yet still a typical project, was the preparation by the Materials and Processes Subdivision of Aeronautical Information Report No. 8. Comparably it lists both American and British interchangeable and substitute materials for the repair and maintenance of aircraft, engines, and accessories at military service depots around the globe. This work has received the approval of the American Army Air Forces, U. S. Navy Bureau of Aeronautics, Society of British Aircraft Constructors, War Materials Committee, and the Ministry of Aircraft Production.

## ■ Promote International Standards

Late in the year the Division contributed to the progress toward uniformity in international aeronautical industrial standards by participating actively in the work of the American Aircraft Technical Mission. The Mission, which included SAE representatives, was sent to England for the purposes, among others, of exploring possible ways and means of reconciling differing aeronautical standards and of establishing the working basis for an agreement which would assure both military and industrial advantages.

Throughout the whole range of automotive standards, as well as in the aeronautical field, increased activity has kept pace with growing war demands and indicated requirements of post war.

One outstanding forward step has been development of a tentative uniform method for specifying the hardenability of steels, employing the SAE End Quench Method. Prepared cooperatively by the Iron & Steel Division of the General Standards Committee and the Alloy Technical Committee of the American Iron & Steel Institute, the new method meets a pressing need for uniformity in the utilization of the hardenability test as an engineering and purchasing tool. The method is outlined in a pamphlet which presents hardenability bands for nearly 40 steels procurable on a hardenability basis. Additional bands covering NE and SAE steels are being prepared. To facilitate application of this method to industrial operations, the SAE Hardenability Test published in SAE Handbook has been revised by experts seeking to provide a closer reconciliation of tests from different laboratories.

In response to a demand from users of shot-peening, which now is known substantially to improve fatigue resistance and applications of which greatly have broadened in war-production industries, the Committee's Production Division has undertaken the standardization of sizes of shot and grit.

Preparatory to establishing a new American standard for involute splines, the Parts and Fittings Division has worked out preliminary data in cooperation with SAE Aeronautics Division, American Gear Manufacturers Association, American Society of Mechanical Engineers, and National Machine Tool Builders Association. Objectives are to provide a flat base design for applications where space is limited and stresses not excessive, and to make the new standard interchangeable with AS-84, which was offered as a basis, provided the outside diameter of the external and the inside diameter of the internal are given a slight chamfer. The Division has been working also on both taper and square shaft ends, on rod ends and pins, and on spring lock washers.

The Electrical Equipment Division has undertaken to review all standards under its jurisdiction and has prepared extensive revisions and additions.

The Motor Coach and Motor Truck Division has initiated a number of projects, including development of specifications for fuel supply tanks mounted in exposed positions, of standard provisions for storing fuses and flag kits required by ICC regulations, and of tractor-trailer fifth wheels.

For the future, the SAE General Standards Committee contemplates an expanded program of standardization activities, in part international in scope to meet the needs of an expected global spread of mechanization and motorization, and the increased participation of American manufacturers in foreign markets.

Advisory engineering services rendered by the SAE War Engineering Board to military and civilian agencies of Government appear to be transcending wartime difficulties and shortage problems, and to be trending toward basic, inclusive engineering projects related to processes, technology, and procedures of the automotive industry.

These projects have obvious industrial and post-war values. They promote inter-industry as well as inter-company cooperation for the solution of technical problems of mutual interest. They serve the essential purpose of coordinating technical knowledge derived from many different sources.

One typically cooperative current study is concerned with the destructive effects of tropical fungi upon military automotive equipment and with the development of preventives. This project has attracted the cooperation of representatives of manufacturers of chemicals, electrical goods, cork, treated paper, and gaskets, as well as of scientists affiliated with government and with industry. Chemical manufacturers are providing fungicides wherewith to treat equipment under Ordnance supervision. When, as, and if these treatments prove effective, the treated equipment is turned over to automotive engineers for consideration from a functional standpoint.

## ■ WEB Aids Military and Industry

Related project is the preparation of a "Manual of Design for Corrosion-Proofing Military Automotive Equipment," which stems similarly from service difficulties in the Pacific war theater with extreme temperature and humidity, constant rainfall, and salt air. In this case also the projects contribute both to the war program and to preparations for serving post-war's global market. Objective is to determine the best treatments for many different parts and materials and to devise methods of application either in the field or during manufacture. Here again inter-industry cooperation has been highly developed, participation in the project being shared by representatives of manufacturers of chemicals, rust-proofing compounds, pat-

ing and treating processes, vehicles, engines, parts, and equipment.

Another W. E. B. project promising substantial benefits to industry, also undertaken at Ordnance request, is analysis of captured automotive equipment to ascertain which features of that equipment are more likely to be of interest to the Army and to industry for further investigation and test. Eleven technical committees, inspecting equipment at Aberdeen Proving Ground, have pooled their findings in a comprehensive report of catalog proportions. After Ordnance has distributed this report to interested companies in industry, W. E. B. will continue its service to Ordnance by assisting in coordination of such requests for opportunity to conduct further tests as Ordnance may receive. Thus W. E. B.'s work is facilitating the chances of every company in American industry to test the products of overseas competitors and to take advantage of any progress made by the enemy.

Literal invasion of new fields of science is growing out of a W. E. B. project, undertaken for the U. S. Navy, having as its objective the development of new methods of measurement of torsional vibration in diesel installations. Special goal of the W. E. B. group is attainment of measuring methods suitable for use at the point of engine operation by personnel which is not highly trained. The project, already productive of voluminous technical literature, promises results vastly transcending the stated objective's wartime applications.

Other projects, reports, and recommendations in course of completion by W. E. B. represent helpful engineering work undertaken for the Army, Navy, War Production Board, and other military or civilian agencies. Among those obviously promising post-war industrial benefits are recommendations for precise process control of steel, malleable, and gray iron castings; recommendations covering the production of aluminum castings; and complete technical treatment of the subject of addition-agent steels.

## ■ T&M Compiles Technical Data

The SAE Transportation & Maintenance Activity has served both military and civilian branches of Government, as well as civilian motor vehicle operators, by compiling from nationwide engineering experience technical literature never before available on operating and maintaining motor vehicles. The SAE-ODT Maintenance Methods Coordinating Committee has continued to provide the Office of Defense Transportation with engineering reports which have formed the technical basis of ODT policies underlying its campaign to conserve irreplaceable civilian motor vehicles. The SAE Ordnance Vehicle Maintenance Committee has supplied recommendations to Ordnance to aid its operation of the world's largest fleet of motor trucks. The SAE T&M Sponsoring Committee has continued to develop pertinent technical information for the advice and use of civilian operators of motor truck fleets.

Typical project has been that of the Committee on Limits and Tolerances for the Replacement of Parts. At the request of the Ordnance Vehicle Maintenance Committee, this group has been endeavoring to establish time and wear standards for the discard or reclamation of engine, axle, and transmission parts. Data has been compiled from personal experience and from fleet records. Parts recovered from Army junk piles are being classified to serve as reference units. A committee concerned with axle shafts has assembled from many sources practical data on welding procedure, and has prepared for Ordnance recommendations for emergency repair of broken shafts. Another committee, interested in brake drum reclamation, has initiated research in metal-spraying which already has led to development of techniques for producing replacement brake paths having adequate wear resistance. After classifying junked valves and devising reclamation methods, a Valve Reclamation Committee has made reports to Ordnance which show satisfactory progress and indicate that reclaimed valves are demonstrating such remarkable longevity that their life cycle cannot even yet be ascertained.

## ■ TWEC Work Has Post-War Aspects

Work of the SAE Tractor War Emergency Committee has assumed definitely post-war aspects with the successful completion of emergency projects.

A project concerned with the reduction and simplification of sizes of tires and rims for rubber-tired tractors and farm implements has invited the interest and cooperation of the tractor industry, tire and rim industries, the Tire and Rim Association, WPB Farm Machinery Branch, and Rubber Director's Office, which see possibilities of achieving substantial economies. Representatives of Canadian rubber companies have been interested in adjusting their tire sizes to the master list under preparation through the work of TWEC.

Continuing TWEC project has been that of classifying tractor fuels with the objective of adopting a minimum number for use in carburetor-equipped tractors now troubled by a variety of fuels differing as much as 50 octane numbers. Numerous meetings have been held with representatives of the various interested industries, and agreements are believed to be in the offing on certain basic fuel classifications which will provide the tractor operator with the best possible fuel at the lowest cost. A CRC subcommittee now is working with a TWEC-Petroleum Industry committee to develop a fuel-classification test program.

TWEC has been working with Ordnance in devising standard controlled conditions for mud-testing motorized military equipment at Aberdeen Proving Ground.

## ■ CRC Coordinates Fuels Research

Wartime demands for maximum service from motorized military equipment has imposed peak loads upon fuels and lubricants. Cooperation with the military by the Coordinating Research Council, of which SAE and API are sustaining members, has served the necessitous purpose of coordinating engineering interest in developing the best combinations of fuels, lubricants, and equipment, and of utilizing the nation's petroleum research talent and facilities for the solution of serious technical problems.

Typical are 16 vapor lock projects simultaneously prosecuted by the CRC Aviation Fuels Division in answer to requests from the Army and Navy for aid in overcoming certain operating difficulties, or in solving phase problems, which have handicapped flight tactics. Numerous high altitude flights have been made to check laboratory work on fuels and equipment. Study of the effects of temperature upon vapor lock has produced a more accurate method of making vapor pressure determinations, developed less complicated apparatus for measuring the air content of

fuels at altitude, and has led to cooperation with carburetor manufacturers in analyzing the effects of fuel changes upon metering.

Another CRC project has called for coordination of research work embracing 14 aviation fuel detonation tests which range the gamut from correlation of single- and multi-cylinder testing to flight testing under two CRC procedures. One phase of this work, the improvement of instrumentation, required a 14-day meeting of the instrumentation panel. Currently under way are projects looking to improvement of laboratory evaluation of aviation fuels, both of present and future ranges; and correlation of American methods with those of the British.

Scope of CRC work is revealed by the facts. It has filed more than 180 technical reports, and now is working on 275 projects. Its effectiveness has been signalized by presentation to CRC of the Ordnance Distinguished Service Award.

Internal reorganization of CRC during 1944 has permitted working groups to be reduced in size and given specific tasks on an ever-widening research front.

## Capacity Audiences Attend SAE Meetings

The virility and constructive activities of SAE make themselves particularly apparent in SAE meetings. Ten national meetings were organized and conducted during 1944 under direction of the SAE Meetings Committee. These meetings, each of which was developed with the cooperation of one or more of the 11 Professional Activity Meetings Committees, attracted a record total registration of 8609 and permitted the record presentation of 185 technical papers.

Because they facilitated the interchange of pertinent war engineering information among top engineering specialists of military and industry alike, these working meetings have become firmly established as vital elements of the nation's war production program. Their efficacy is enhanced by the participation of ranking military engineering officers and specialists who, relating wartime automotive engineering to actual field and battle experience, give engineers responsible for designing and producing motorized war equipment a thorough understanding of service demands, requirements, and conditions. At the same time, contacts with design and production engineers give military representatives better understanding of the functions, and of the requirements, of design and production.

These SAE meetings have enabled the military to make its engineering needs known to industry more effectively, than other wise would be possible. In fact, meetings have ranged over war design and production, covering the engineering fields of aeronautics, diesel engines, fuels and lubricants, war materiel, transportation and maintenance, tractor and farm machinery, and air cargo.

While essential war engineering subjects have dominated meeting programs, it has been found possible to appraise wartime engineering developments and progress in terms of the needs of peace and of improved post-war products. It may be expected that, at 1945 meetings, the proportion of technical papers correlating wartime progress with post-war needs will be increased substantially although military considerations will have pre-eminence until final victory.

Inauguration during 1944 of the new SAE Air Transport Engineering Activity contributed additional technical sessions to National Aeronautic, Air Cargo and Annual Meetings.

Engineering displays held in connection with meetings at Detroit and Los Angeles attracted record crowds and made substantial contributions to technical knowledge by supplementing tangibly the subject matter of the programs.

No small part of the success of 1944 SAE meetings may be ascribed to the interest, cooperation, and participation of SAE Sections, including the Metropolitan, Chicago, Detroit, Philadelphia, Oregon, Northwest, Northern California, Southern California, Milwaukee, Kansas City, and Mid-Continent. Whether the meetings or Sections benefit the more is less important than this convincing demonstration that, however heterogeneous geographically and industrially SAE Sections may be, organizationally they are homogeneous beyond question.

The increasing interest promises that additional meetings may be expected to develop with and from growing SAE activities. Although there are limits to the number of national meetings which constructively can be organized and held within any 12-month period, the desire for more must be accepted as proof of the excellence of SAE meeting programs. Either additional meetings, or longer and more comprehensive meeting programs are the answers.

## Growing SAE Membership Approaches 12,000 Mark

Further evidence of beneficial SAE activities is to be found in the continuing upswing in Society membership which ends 1944 with a total of approximately 11,000, representing an increase over 1943 of roundly 19%.

In 1944, upwards of 2200 joined or were reinstated in the Society. Only about 340 left the Society by reason of death, resignation, or cancellation. Less than 200 were transferred to reserve status, most of whom are in the military services and currently not situated so that they can benefit from SAE activities.

Major credit for this gain in membership goes to Section, Group, and Activity membership committees functioning under direction of the SAE Membership Committee, and to those individual members who have made friends and co-workers aware of the advantages of SAE membership.

Indications are that SAE membership will continue to grow. The rate of growth may not be as rapid as during the war and the years immediately preceding, yet the Society has substantial reasons for expecting healthy and satisfactory expansion in its membership as industries reconvert to peacetime operations.

Membership growth further is reflected in the progress made by SAE Sections and Groups, which report for 1944 a really remarkable upswing in interest and in attendance at meetings. Both Sections and Groups have developed meeting programs of high caliber. Several Sections commendably have sponsored meetings which have attracted nationwide attention, such as the one-day Transportation & Maintenance Meeting at Pittsburgh, Pa., and the two-day Air Transport Engineering Meeting at Kansas City, Mo.

The Society has been privileged to welcome the addition of two new Sections and of two new Groups during 1944. The former Muskegon Group has become the West

ern Michigan Section. Part of the territory of the Southern Ohio Section has been transferred to the new Cincinnati Section, which further has extended its area to embrace three Kentucky counties. The Salt Lake City Group has been organized in virgin territory. The Spokane Group has been organized to serve a part of the territory formerly assigned to the Northwest Section, as well as additional territory in Idaho and Montana.

Commendable progress has been made in improving SAE's organizational relationships with Sections and Groups. A new method of financing makes the distribution of Section funds more equitable. Operating scope of the Sections Committee has been clearly defined and a plan for streamlining its activities put into effect, with the result of assuring the Sections larger representation in SAE affairs and closer contacts with SAE Council. Provision has been made for the presentation of certificates of appreciation to retiring Section chairmen, customarily at special ceremonies. A majority of the Sections already has made the awards.

Growing interest in areas not presently served by SAE Sections and Groups indicates the probability of further expansion in 1945 and future years.

Unsettled wartime conditions in colleges and universities have tended to curtail SAE Student Enrollment and SAE Student Branch activities. Groundwork for post-war expansion in this field, however, gives definite indication that Student Enrollment will increase with college registrations after the war, and that Student Branches will grow in number and activities.

During the war years, comparatively few SAE members have been available for employment. However SAE Placement Service has received many compliments for effectively uniting members seeking jobs and companies seeking personnel. Organization and operations of the Service now are being surveyed with the idea of meeting the expected need for augmented activity during the immediate post-war period of reconversion.

# SAE Publications Reflect Society's Widening Scope

Broadening scope of SAE activities and the production of technical data in growing volume continued during 1944 to demonstrate that, despite recognized editorial excellence, SAE publication facilities, as presently constituted, are insufficient to meet growing requirements.

The need for expansion, heightened by paper shortages and wartime mechanical difficulties, has been recognized by the SAE Council, which has taken action looking toward removal of existing inadequacies.

Pursuant to a recent recommendation of its Finance Committee for publications expansion as soon as funds could be provided, SAE Council instructed the headquarters Publications Division to study and to report to the Publications Committee the possibilities and costs of setting up SAE Transactions as a publication whose text material would be entirely separate from that of the *SAE Journal*. These studies are nearing completion. Recently also SAE Council approved a plan for implementing new procedures for publishing the reports of SAE technical committees (except those of war committees) and miscellaneous technical data.

During 1944 the *SAE Journal* brought to member readers editorial contents somewhat increased over those of 1943, a modified type of news coverage to handle the increased scope and number of national meetings, and a large increase in the volume of news of the activities of SAE members. An expanded Transactions Section permitted publication of a larger number of full-length technical papers. A new section presented digests of all technical papers received at headquarters from SAE meetings.

Wartime difficulties adversely affected the *SAE Journal's* paper quality, printing, binding, and mailing. Mechanical excellence of the publication admittedly declined, but improvements in layouts and in the handling of articles was noticeable, and the *Journal* regularly came out on time.

**Income and Expense and Budget Comparison**
**12 Months Ending Sept. 30, 1944**
**In Agreement with Haskins & Sells Audit**

| Oct. 1 to Sept. 30 | 1943/1944 | 1942/1943 |
|---|---|---|
| **INCOME** | | |
| Dues and Subscriptions | $147,682.20 | $123,529.09 |
| Initiation Fees | 45,057.00 | 37,382.50 |
| Interest and Discount | 7,682.38 | 7,757.35 |
| Affiliated Appropriations | | 1,229.17 |
| Advertising—Journal | 300,619.50 | 221,451.75 |
| Advertising—Handbook | 15,550.00 | 14,050.00 |
| Miscellaneous Sales | 51,480.20 | 68,966.37 |
| Profit on Sales of Securities | 1,343.36 | |
| Unpaid Portion of Section Dues | 3,298.50 | 3,001.00 |
| Total Income | $572,713.14 | $477,367.23 |
| **EXPENSES** | | |
| Research | $ 2,494.05 | $ 1,951.56 |
| Coordinating Research Council | 34,000.00 | 27,625.00 |
| Standards | 53,109.42 | 47,249.76 |
| Publications | 88,698.17 | 81,194.89 |
| Sections | 9,803.32 | 8,927.87 |
| Membership | 20,591.26 | 19,048.34 |
| Engineering Relations | 2,331.58 | |
| Meetings | 39,395.09 | 22,786.13 |
| Advertising—Journal | 85,267.98 | 69,632.85 |
| Advertising—Handbook | 2,430.09 | 2,945.04 |
| Miscellaneous Sales | 29,516.47 | 40,812.48 |
| Miscellaneous Government Cooperation | 25,640.77 | 19,887.60 |
| Detroit Office | 17,868.10 | 14,343.84 |
| Professional Activities | 9,479.90 | 10,529.24 |
| West Coast Branch Office | 11,749.68 | 11,582.85 |
| General Expense | 133,391.82 | 109,439.57 |
| Loss on Sale of Securities | | 880.09 |
| Total Expenses | $565,767.70 | $488,837.11 |
| Net Unexpended Income | $8,945.44 | −$11,469.88 |

**BALANCE SHEET**

| ASSETS | |
|---|---|
| Cash—General | $90,503.91 |
| Cash—SAE War Chest | 48,721.29 |
| Cash—Restricted | 8,245.41 |
| Notes and Accounts Receivable | 9,136.85 |
| Securities | 318,263.20* |
| Accrued Interest on Securities | 2,143.83 |
| Inventories | 821.45 |
| Deposits | 475.00 |
| Furniture and Fixtures | 1,000.00 |
| Deferred Charges | 26,135.68 |
| Total Assets | $505,446.62 |
| **LIABILITIES AND RESERVES** | |
| Accounts Payable | $15,773.85 |
| National Dues and Miscellaneous Items Received in Advance | 35,163.56 |
| Deferred Credits | 6,022.15 |
| Reserve for Restricted Funds | 8,245.41 |
| SAE War Chest | 48,721.29 |
| General Reserve | 391,520.36 |
| Total Liabilities and Reserves | $505,446.62 |

* Book Value—(Market Value 9/30/44 315,963.00)

This indicated decline in value is due entirely to the decrease in market value of Government bonds in acordance with predetermined valuations set at time of issue. This is scheduled to be corrected by maturity.

During 1943-44 a total of $71,295.00 was transferred from the SAE War Chest to General Reserve.

## Joins C&O Lines

Kenneth A. Browne, formerly research engineer and technical consultant, Wright Aeronautical Corp., has been appointed to the newly created post of research consultant to the presidents of Chesapeake & Ohio, Nickel Plate and Pere Marquette Railroads, with headquarters at Cleveland. Mr. Browne will head a department of research engineering which has been established jointly by the three C&O lines

**ARTHUR NUTT,** who supervised development of the engine which powers the giant B-29 superfortress, has joined Packard Motor Car Co. as director of its aircraft engineering division on the staff of **COL. J. G. VINCENT,** vice-president of Packard engineering. In his new capacity Mr. Nutt has charge of research engineering facilities at the company's Toledo division, where he maintains his headquarters, and those under construction at Willow Run Army Air Base in a long-range developmental program. He recently resigned as vice-president of engineering of Wright Aeronautical Corp. after completing 28 years of work on both Wright and Curtiss aircraft engines. Aside from his executive contributions to the war effort, Mr. Nutt has played a major role in the SAE war program. A past-president of the Society, he is chairman of the Aeronautics Division of the SAE Standards Committee, a member of the SAE War Activity Council, and the SAE Council.

**STANLEY H. PAGE** has joined Joshua Hendy Iron Works, Sunnyvale, Calif., where he is in charge of diesel development. He was formerly vice-president, Union Diesel Engine Co., Oakland, Calif.

**JOHN C. REDMOND** has been elected president, Superior Alloys & Metal Products Co., Philadelphia. He had been vice-president, Transue & Williams Steel Forging Corp., Alliance, Ohio.

Formerly key machinist, Indiana Gear Works, Indianapolis, **JAMES R. REED** is now product engineer, Lucas-Harold Corp., same city.

**JOHN W. F. READ,** previously traffic manager, Babcock & Wilcox Co., Alliance, Ohio, is now production planning department manager, Ingersoll Steel & Disc Division, Borg-Warner Corp., Kalamazoo, Mich.

**JAMES M. FISKE,** formerly research engineer in charge of laboratories, Aircooled Motors Corp., Syracuse, N. Y., is now mechanical engineer in the research department, Florida Division, Food Machinery Corp., Dunedin, Fla.

**C. ROBLEY PATTERSON** is now with Standard Oil Co. of Calif., El Segundo, in the mechanical engineering design department. He was formerly mechanical engineer and manager of the Washington office of Lights, Inc., Alhambra, Calif.

**ENSIGN GEORGE EUGENE ADAMS,** U. S. Navy, formerly at the General Ordnance School, Navy Yard, Washington, D. C., is now at the Naval Air Technical Training Center, Jacksonville, Fla.

**ANGUS H. McGREGOR,** who had been planning supervisor, Manufacturing & Repair Section, Maintenance Division, U. S. Army Air Forces, Air Service Command, Miami, Fla., is now field engineer, Florida Shipbuilding Corp., same city.

**DONALD WALLACE MITCHELL,** U. S. Coast Guard, has been transferred from the Patrol Base, New Haven, Conn., to the U. S. C. G. Air Station, Miami, Fla.

**RUSSELL H. JOHNSON,** formerly a major in the U. S. Army Ordnance Department, Army Service Forces, Washington, D. C., is now on inactive duty, and is affiliated with General Motors Corp., Flint, Mich.

**THOMAS L. JACKSON,** who had been in the aircraft engineering department of Ford Motor Co., Detroit, is now in the U. S. Army, stationed at Wright Field, Dayton, Ohio.

**H. W. ROBERTS** has been promoted from vice-president and manager to president of Roberts Motor Co., Portland, Ore. Mr. Roberts was 1932-1933 chairman of the SAE Oregon Section.

# About SAE

**KENNETH R. TREER,** previously production test engineer, Thompson Product Inc., Cleveland, is now in the U. S. Army stationed at Lowry Field, Denver, Colo.

Formerly an associate of John Tjaarda & Associates, Detroit, **ARTHUR M. FITZPATRICK** is now an ensign in the U. S. Navy, stationed at the Bureau of Aeronautics, New York City.

**LEVON PARMAKIAN** has been appointed special assistant to the factory manager, Pratt & Whitney Aircraft, East Hartford, Conn. He had been principal mechanical engineer, U. S. Army Air Forces, Wright Field, Dayton, Ohio.

**SAMUEL F. PRATT,** formerly vice-president, Union Trading Co., Inc., New York

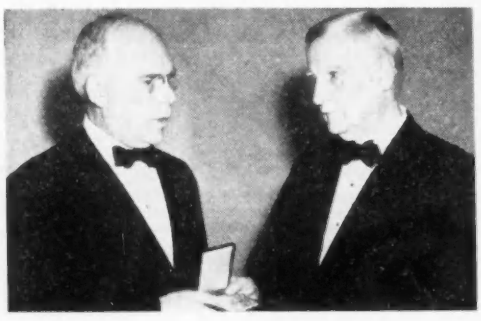
Samuel F. Pratt

City, is now manager, Division of Lubricants, Maritime Petroleum Corp., same city.

**OSCAR M. BREDE** has become a partner of General Truck Sales, San Francisco. He had been general parts and service manager, GMC Truck & Coach Division, GMC, Pontiac, Mich.

**CHARLES E. SNYDER** is now a lieutenant (jg) USNR, stationed at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C. In civilian life he was secretary and general manager of Snyder Automobile Co., York, Pa.

## SAE Men Honored by ASME



Robert M. Gates (extreme left), president of the American Society of Mechanical Engineers, is shown presenting the ASME Medal at the annual meeting dinner of the Society Nov. 29 to Edward G. Budd, president of Edward G. Budd Mfg. Co. "because of his outstanding engineering achievements." Dr. George W. Lewis (extreme right), director of aeronautical research, National Advisory Committee for Aeronautics, was awarded the "Spirit of St. Louis Medal" for "meritorious service in the advancement of aeronautics" at the same dinner. Dr. Lewis, past-vice-president of the SAE Aircraft Engine Activity, is chairman of the SAE General Research Committee

# tSAE Members

DALE HASLER, a former student of General Motors Institute, is now a second Lieutenant, U. S. Army Air Forces, who may be reached at Luke Field, Phoenix, Ariz.

Formerly design engineer, Emerson Electric Mfg. Co., Turret Division, St. Louis, Mo., MELVIN A. HANSON is now equipment design engineer, Hughes Aircraft Co., Culver City, Calif.

RAYMOND L. MUSSATTO is now employed by A. L. Burbank & Co., Ltd., New York City, as a junior engineer. He had been in the U. S. Maritime Service, Training Station, Hoffman Island, S. I., N. Y.

MAJOR BURTON W. ELGIN has recently returned from overseas service after spending 16 months in the North African and European Theaters of Operation. He is now on the inactive list, and has returned to his former civilian position as technical

Major Burton W. Elgin

sales representative for Firestone Aircraft Co., Akron, Ohio.

MERRITT A. MIERAS, formerly chief engineer, Industrial Wire Cloth Production Corp., Wayne, Mich., is now vice-president, Novi Equipment Co., Novi, Mich.

Previously design draftsman, Carney Engineering Co., New York City, CHARLES S. MILLER is now layout draftsman, Bendix Aviation Corp., Marine Division, Brooklyn, N. Y.

CHARLES C. WEBB may be reached at Baltimore Enamel Co., Baltimore, Md., where he is factory manager. He had been chief engineer, Wheeling Stamping Co., Wheeling, W. Va.

ROBERT D. HARVEY, a captain in the U. S. Army, has moved from Camp Haan, Calif., to Camp Blanding, Fla.

LT.-COL. W. H. FISHER, U. S. Army, has been transferred from Camp Hood, Tex., to Camp Maxey, Tex.

ENSIGN JEROME D. ALLYN, USNR, is stationed at the Bureau of Aeronautics, Washington, D. C. In civilian life he was service representative, Bendix Products Division, Bendix Aviation Corp., South Bend, Ind.

**Elected President**

**Archibald A. Warner has been elected president and general manager of Rockford (Ill.) Drilling Machine Division, Borg-Warner Corp. He had been works manager of Mechanics Universal Joint Division of the corporation since 1941**

J. E. REAGAN, who had been general service manager, Timken Roller Bearing

J. E. Reagan

Co., Canton, Ohio, has been appointed director of sales and service, Elco Lubricant Corp., Cleveland.

G. O. WIGGIN has been appointed assistant general manager of the Aeronautical Chamber of Commerce, where he will coordinate the activities of the eight committees of the Aircraft Manufacturers Council and assist in the management of the service departments of the Chamber. Mr. Wiggin's former position was executive engineer, Ranger Aircraft Engine Division, Fairchild Engine & Airplane Co., Farmingdale, L. I., N. Y.

G. O. Wiggin

JOHN G. MYERS has joined Keller Tool Co., Grand Haven, Mich., as a designer. He was formerly layout draftsman, Allison Division, GMC, Indianapolis.

ARTHUR R. MILLER, formerly resident industrial engineer, Allen Drury Palmer Industrial Engineers, St. Louis, Mo., is now a mechanical engineer, Massey-Harris Co., Tank Division, Racine, Wis.

JOHN B. MITCHELL is now an ensign, USNR, stationed at the U. S. Naval Supply Depot, Mechanicsburg, Pa. He had been engine designer for Detroit Diesel Engine Division, GMC, as a civilian.

LT. (jg) WILLIAM B. CRUMP, USNR, has been transferred from the Naval Air Station in Glenview, Ill., to the one at Memphis, Tenn.

ALBERT W. PINGREY is now employed by the U. S. Navy as a foreman at Sand Point, Seattle, Wash. He was formerly an aircraft instructor, Pan American Airways, Yakima, Wash.

REINHARDT N. SABEE, who had been with Micromatic Hone Corp., Detroit, as research engineer, is now chief of research, Special Machine Division, Sav-Way Industries, Centerline, Mich.

ROLAND S. ELY, formerly assistant chief pump engineer, Chandler-Evans Corp., South Meriden, Conn., is now associated with Connecticut Hard Rubber Co., New Haven, Conn., as assistant factory manager.

EDWARD O. GRABOW, JR., U. S. Army, has been transferred from Lowry Field, Colo., to the 810th Troop Carrier Command, Maxton Army Air Base, Laurenborg, N. C.

WARREN C. PRATT is now an engineer connected with Square Tool, Die & Mfg. Co., Detroit. He has been a consultant with offices in Birmingham, Mich.

COL. AL BODIE, who recently returned from overseas service to assume the civilian position of director of post-war engineering and manufacturing, United Aircraft Products, Inc., Los Angeles, is now a consulting engineer with offices in Beverly Hills, Calif.

He is engaged in the design, development and experimental work prior to production on post-war commodities applicable to automotive as well as aircraft equipment.

**JAMES L. CARSON** is now employed as special representative of the National Account Division, Autocar Sales & Service Co., New York City. He had been principal requirements officer and chief of the Transportation Section, Foreign Economic Administration, Egypt.

**DONALD W. ROSS,** who had been supervisor of tool design, plant A, North American Aviation, Inc., Grand Prairie, Tex., is now equipment engineer, exploration research laboratory, Stanolind Oil & Gas Co., Tulsa, Okla.

**GROSVENOR HOTCHKISS,** former editor of the SAE Metropolitan Section *Accelerator* and a member of that Section's Governing Board, has been appointed coordinating engineer, Western Union Telegraph Co., New York City.

**G. J. RETZLAFF,** who had been assistant service manager, Harnischfeger Corp., Milwaukee, is now sales manager, Ford Motor Co., same city.

Previously chief engineer, Educational Division, Aero Industries Technical Institute, Los Angeles, **JAMES S. RICKLEFS** has been named chief of structures, Landgraf Helicopter Co., same city.

**LEIGHTON M. LONG** is no longer research supervisor, Battelle Memorial Institute, Columbus, Ohio, having formed his own consulting engineering firm, Leighton M. Long & Associates, Toledo, Ohio.

**BEN G. PARSONS,** formerly a consulting engineer, is now president of Fuelcharger Corp., Detroit.

**LARRY E. O'NEIL,** who had been on the engineering staff of Andover Motors Corp., Elmira, N. Y., now has the same position with Wyse Laboratories, Dayton, Ohio.

Previously a machinist, Savage Arms Corp., Utica, N. Y., **WENDELL W. MORROWS** is now the owner of Brookfield Garage, Brookfield, N. Y.

**WILLIAM RINN MUNFORD** is now chassis layout draftsman, Chrysler Corp., Detroit. He had been a draftsman for Packard Motor Car Co., same city.

**ROBERT W. MOWERY,** formerly general manager, Manufacturers' Machine Shop, Inc., Cleveland, is now service engineer, S. K. Wellman Co., same city.

**WILLIAM G. NEWMAN** has recently joined Graham-Paige Motors, Inc., Detroit, as engineer in charge of experimental work. He was formerly design engineer, Pioneer Engine & Mfg. Co., Detroit.

**OLEG J. DEVORN** is now assistant chief development engineer, Sikorsky Aircraft,

Oleg Devorn

Bridgeport, Conn. He was previously senior structural engineer for the company.

**CHARLES P. NELSON,** who had been chief automotive adviser, Vancouver Ordnance Service Command Shop, Vancouver Barracks, Wash., is now head automotive adviser at Camp Roberts, Calif.

## Promotions in Armed Forces

Col. Clyde H. Mitchell

**Advancements in rank have been received by the following SAE members: CLYDE H. MITCHELL, chief of the aircraft subsection, Procurement Division, Air Technical Service Command, Wright Field, is now a colonel; JOSEPH C. SCOTT, equipment laboratory, Headquarters, Air Technical Service Command, Wright Field, has been made a major; ROBERT A. COLE, assistant chief of the field test unit, ATSC, is now a captain; and STEPHEN F. ROSSITER, JR., USNR, Bureau of Aeronautics representative, Pratt & Whitney Aircraft Corp. of Mo., is now a lieutenant (jg)**

Major Joseph C. Scott

Captain Robert A. Cole

Lt. (jg) Stephen F. Rossiter, Jr.

Frank W. Lynch

**FRANK W. LYNCH** has recently resigned his position as district manager of the Automotive Division, Timken Roller Bearing Co., Detroit, and has joined Reynolds Metals Co., same city, as district engineer.

**FREDERICK A. HIERSCH** is now connected with Al-Fin Corp., Jamaica, L. I., N. Y., as cooling engineer. He had been mechanical engineer, Thermodynamics Division, Heat Transfer Section, National Advisory Committee for Aeronautics, Cleveland.

**J. M. HORN,** who had been field and experimental engineer, Massey-Harris Co., Racine, Wis., is now tractor engineer, Cockshutt Plow Co., Ltd., Brantford, Ont., Canada.

Formerly service engineer, Ohio Ball Bearing Co., Cleveland, **HARLAND C. JOHNSON** is now manager of Bearing Distributors, Inc., Pittsburgh, Pa.

**JOHN L. HITTELL,** previously tool design engineer, Ex-Cell-O Corp., Detroit, is now chief of the Technical Division, University of Michigan, Detroit.

## OBITUARY

### *Charles S. MacNeil*

Charles S. MacNeil, 34, chief engineer of Aeroproducts Division, General Motors Corp., died Nov. 18 of a heart attack. Mr. MacNeil, who was the co-inventor of the Aeroproducts automatic, constant-speed propeller, had addressed the Air Transport Meeting of the SAE Kansas City Section two days before his death.

Recognized as one of the foremost propeller authorities in the country, Mr. MacNeil had been appointed chief engineer of Aeroproducts in 1940. After graduating from M.I.T. in 1933 he joined Curtiss Propeller Division, which he left to form with W. J. Blanchard the consulting firm of Blanchard & MacNeil in 1936. This was later incorporated as Engineering Projects, Inc., forming the nucleus for Aeroproducts Division.

Since becoming an SAE member in 19[illegible], Mr. MacNeil had taken an active interest in Society affairs. He was a member of the Aircraft Propeller Subdivision of the SAE Standards Committee, and had served on the governing board of the SAE Southern Ohio Section in 1943-1944.

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# SAE Coming Events

## National Meetings

**Annual Meeting & Engineering Display,** *Jan. 8-12, 1945, Book-Cadillac Hotel, Detroit*

**Aeronautic,** *April 4-6, 1945, Hotel New Yorker, New York*

**T & M Meeting,** *May 2-3, 1945, Hotel William Penn, Pittsburgh*

**Diesel F & L,** *May 16-17, 1945, Carter Hotel, Cleveland*

**War Materiel,** *June 4-6 , 1945, Book-Cadillac Hotel, Detroit*

**West Coast T & M Meeting** Aug. 23-24, 1945, Biltmore Hotel, Los Angeles

**Tractor,** *Sept. 12-13, 1945, Schroeder Hotel, Milwaukee*

**Aeronautic Meeting,** Oct. 4-6, 1945, Biltmore Hotel, Los Angeles

### Chicago – Jan. 16 and 30

Jan. 16 – Turner Hall, South Bend; dinner 6:45 p.m. Truck Axle Trend and the Development of the Tubular Type Rear Axle Housing – G. C. Vanderberg, axle engineer, Clark Equipment Co., and George Spatta, general manager, Clark Equipment Co.

Jan. 30 – Knickerbocker Hotel; dinner 7:30 p.m. Navy Night. Limited to members, applicants and military personnel. Life and Experiences of a Navy Man Aboard a Submarine Sunk in Action – George Bernack, torpedoman. Motion Picture.

### Cincinnati – Jan. 18

Alms Hotel; dinner 6:30 p.m. Inspection Methods of Metal Parts – Lt.-Col. George M. Enos, U. S. Army Ordnance Division, Cincinnati. Aircraft Engine Performance – Speaker – representative from Wright Aeronautical Corp. Motion Picture.

### Cleveland – Jan. 15

Cleveland Club; dinner 6:00 p.m. The Automotive Vacuum Brake – T. H. Thomas, chief engineer, BK Vacuum Power Equipment Department, Bendix Products Division, Bendix Aviation Corp. Annual Meeting High-Spots – John A. C. Warner, secretary and general manager, SAE. J. M. Crawford, chief engineer, Chevrolet Division, General Motors Corp. and president-elect SAE. Subject to be announced.

### Metropolitan – Jan. 4

Pennsylvania Hotel; meeting 7:45 p.m. Future Trends in Inter-Continental Transport Airplanes – Peyton M. Magruder, chief of new design, Glenn L. Martin Co.

### Mid-Continent – Jan. 26

Mayo Hotel, Tulsa; dinner 6:30 p.m. Metal Aircraft vs. Wood Aircraft – Herb Rawdon, chief engineer in charge of design, Beech Aircraft Corp. Special Feature – Presentation of certificates to past-chairmen.

### Mohawk-Hudson Group – Jan. 23

DeWitt Clinton Hotel, Albany; dinner 7:00 p.m. Standard Practice Instructions – Willard J. Lord, safety engineer, Atlantic Refining Co.

### New England – Jan. 9

Engineers Club, Boston; dinner 7:00 p.m. Gas Turbines and Turbosuperchargers – Dr. Sanford A. Moss, General Electric Co.

### Northwest – Jan. 15

Gowman Hotel, Seattle; dinner 7:00 p.m. Truck Axles from an Engineering Viewpoint – Larry Fischer, executive engineer, Timken Detroit Axle Co. Motion Picture – Helicopters – B. A. Winters, Bell Aircraft Corp.

### Oregon – Jan. 19

Imperial Hotel, Portland; dinner, 6:30 p.m. Engineering Features of an Off-Highway Truck – Merrill C. Horine, sales promotion manager, Mack Mfg. Corp. Slides illustrating paper.

### Peoria Group – Jan. 29

Jefferson Hotel; dinner 6:30 p.m. Fuels and Lubricants as Related to Future Engine Design – R. J. S. Pigott, chief engineer, Gulf Research and Development Co.

### Southern California – Jan. 11

Hollywood-Roosevelt Hotel, Los Angeles; dinner 7:00 p.m. Air Transportation Meeting. Speaker to be announced.

### Southern Ohio – Jan. 8

Engineers Club, Dayton; dinner 6:30 p.m. Joint meeting with ASTE. Diesel Automotive Road Transportation – Fred B. Lautzenhiser, chief transportation engineer, International Harvester Co. High Speed Milling – Howard L. Pope, Cincinnati Milling Machine Co.

### Spokane Group – Jan. 12

Spokane Hotel; dinner 7.00 p.m. Gear Lubrication – E. C. Rawlings, engineer, Standard Oil Co. of Calif.

### Texas – Jan. 19

Blackstone Hotel, Fort Worth; dinner 6:30 p.m. Gasoline and Diesel Fuels for Bus and Truck Operation. Speaker – V. A. Kalicatzsky, technical department, Magnolia Oil Co. Lubricants for Bus and Truck Operation. Speaker – Marion F. Knost, bus and truck representative, Gulf Refining Co.

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## SAE Names CRC Directors

RE-APPOINTED for another two-year term as SAE directors on the Coordinating Research Council Board beginning Jan. 1, 1945, are C. G. A. Rosen and B. B. Bachman. SAE President W. S. James, who replaces J. B. Macauley, Jr., is the only new member of this group.

Representatives of the Society who still have one year to serve on the board are: SAE President-elect James M. Crawford, William Littlewood, Arthur Nutt and James C. Zeder.

## Semi-Annual Meeting Set

THE SAE National War Materiel Meeting, which is to be held at the Book-Cadillac Hotel, Detroit, June 4-6, has been designated as the 1945 Semi-Annual Meeting.

## Capt. Small Promoted, Goes to Norfolk Yard

CAPT. Lisle F. Small, USN, formerly assistant head of the Shipbuilding Division, Bureau of Ships, has been promoted to the post of manager, Norfolk Navy Yard, it is announced by the Navy Department. The captain stimulated industry-wide interest in the problem of torsional vibration in diesel engines, and at his request a committee was formed under the SAE War Engineering Board to study the problem for the Navy.

In a warm letter of appreciation to C. G. A. Rosen, chairman of the Torsional Vibration Committee, Capt. Small wrote on Dec. 5:

> "In taking leave from my duties in the Bureau of Ships I want to express to you and your wonderful committee my boundless gratitude for the splendid work which all of you are doing for the Navy and for the engineering fraternity of this country. Never before have I seen such coordinated devotion to a cause. Every man on your committee is a peer in his own rights. Collectively these men are humble laborers dedicated to a common patriotic purpose.
>
> "When so many great engineers put their shoulders to a task, glorious results are inevitable. There won't be any cheering sections when the goal line is crossed, but I hope with all my heart that each committee member will find on the scroll of his own personal satisfaction an emblem of my own personal gratitude."

## SPLINE STANDARD On Way to Adoption

A NEW involute spline standard, proposed for ultimate adoption not only by the Society of Automotive Engineers but also by the American Standards Association and the American Gear Manufacturers Association, has been circulated to the Parts and Fittings Division of the Standards Committee for a mail ballot.

This proposed standard is being developed under the procedure of the ASA and the work was carried on by a subcommittee of Technical Committee 13 of ASA Sectional Committee B-5. The SAE and the ASME share sponsorship for Sectional Committee B-5.

The proposed new standard is intended to meet the need for a flat-based design, especially for applications where space is limited and stress not excessive.

Some further modifications in the proposal are anticipated before its final adoption. However, at a meeting held in New York late in November, the ASME gave its general approval to the proposal.

## Test Helps Save Lives

IMPORTANT life-saving results have accrued from a Michigan State Maintenance Safety Campaign in which a "one-inch brake pedal test" recommended by the SAE War Engineering Board played an important part.

Developed at the request of the Michigan State Safety Commission last April, the brake check recommended by the W.E.B. was as follows:

> "It is the opinion of the car manufacturers that if the distance between the bottom of the brake pedal pad and the floorboards of any passenger car is one inch or less, when the brake pedal is depressed to the point where the brake shoes come into engagement with the drums, that fact is sufficient evidence to warrant advising the driver that he should have the condition of the brakes checked and adjustments made, if necessary."

The May 1 to June 15 Michigan Brake Campaign, in which this check was used, is officially estimated by the State Safety Commission to have saved 66 lives, avoided 1188 serious injuries and prevented 3630 property damage accidents.

Commenting on the part played by the "one-inch pedal test," the Commission's release says: "The simplicity of the new one-inch test appealed so much to the police that they were stimulated with the result that all kinds of traffic police activity undoubtedly increased, thus tending to reduce all kinds of accidents."



# Rambling Throughout Section

FIRST nighters at **BUFFALO SECTION'S** opening meeting Oct. 11 included a gathering of 80 members and guests, some of whom dined, and all of whom remained to hear a discussion of today's most popular subject, Development of the Helicopter . . . Arthur M. Young, director of the Helicopter Division, Bell Aircraft Corp., provided the information, illustrating it with a motion picture of Bell's work in the field . . .

Canada's role in the future of air transport – the industry's wartime development and its peacetime potentialities – were detailed by W. J. McDonough, president, Central Aircraft Mfg. Co., Ltd., at Nov. 15 **CANADIAN SECTION** meeting (digest of talk appears on p. 43 of this issue) . . . Speaker disclosed publicly many points that heretofore have been made only conversationally, receiving unanimous applause from the 170 people who attended . . .

**W. J. McDonough as he addressed the Canadian Section on The Future of Air Transport and the Aviation Industry in Canada at the roof garden of the Royal York Hotel**

Starting with a diagrammatic review of simple basic elements of vacuum power brake and control installations, T. H. Thomas, chief engineer, B-K vacuum power equipment department, Bendix Aviation Corp., explained the various functions of these devices to group at meeting of the South Bend Division of **CHICAGO SECTION** Nov. 21 . . . He showed how the required accuracy and speed of brake actuation are obtained with a minimum of effort and thought on the driver's part, and stressed the necessity for simplification of design. . . . E. R. Price, development engineer in the same department as Mr. Thomas, co-authored the paper . . .

Over 1146 people attended the great **CLEVELAND SECTION** meeting Dec. 11 at Thompson Aircraft Products plant, acclaimed as a four-star hit due to the contributions of Brig.-Gen. Franklin O. Carroll, chief of the Engineering Division, Wright Field, and guest speaker who discussed Military Aircraft; Fred Crawford, president of Thompson; and Brig.-Gen. Frank P. Lahm, the "granddaddy of Army aviation" . . . Gen. Carroll, who will receive top billing at the SAE Annual Meeting Dinner in Detroit Jan. 10, where he will present a paper on "Steps Up in the Development of the Air Force."


**Speaker Sponsor and Host A. T. Colwell, vice-president, Thompson Products; Brig.-Gen. (retired) Frank P. Lahm; and Brig-Gen. F. O. Carroll, guest speaker, at Cleveland Section meeting**

asserted that the U. S. Army was the first military organization to recognize the value of the airplane as a weapon of war, and to finance and encourage its development throughout the years as a safeguard of the country's security . . . He also disclosed many interesting facts concerning jet propulsion planes, outstanding of which was that this type plane can now climb at a speed considerably in excess of the level flight speed of our fastest present-day conventional pursuit ship . . . Coming out of a shallow dive, he declared, it can climb at the rate of about 40,000 ft per min . . .

# Section Reports

Following his talk was the first public showing of "Combat America," directed by former film actor Clark Gable—an Army motion picture of B-17s with their fighter aircraft in combat . . . Very hot stuff . . .

Fred Crawford, who has just returned from a complete tour of the European battlefronts, vividly described his trip, and particularly impressed upon the audience how badly material and munitions are needed overseas . . . Mr. Crawford, who is also chairman of the board of the National Association of Manufacturers, hopes personally to convey this message by traveling throughout the country and telling the people of what our armies are up against . . .

Introduction by Gen. Carroll of Gen. Lahm (retired), who has been associated with flying since 1904, was a happy sidelight of meeting. . . .

Symposium on Electrical Equipment, chairmanned by P. J. Kent, Chrysler's chief electrical engineer, presented at **DETROIT SECTION** Dec. 4 meeting, where four phases of equipment research design and operation, with special emphasis on requirements of new cars, discussed by as many speakers . . . Trends in automobile ignition covered by H. L. Hartzell, Delco-Remy Division, GMC, who answered questions on research and developments taking place to meet new conditions . . . Trends in automobile radio by J. H. Little, Chevrolet Division, GMC, traced development of radio sets from the first inefficient equipment through the projected frequency modulation sets . . . Trends in indicators and circuit control devices foreseen by E. F. Webb, Chrysler Corp., who spoke of the advantages of various types of instruments and their adaptability to new cars . . . Trends in automotive generator and regulator design, by J. S. Decker, Electric Auto-Lite Co., was a review of recent improvements in this equipment as necessitated by military needs and their effect on post-war design . . .

Grim return from future surmisings to present happenings was story of robot bomb told by Dinner Speaker G. Geoffrey Smith, representative of the British Supply Council, at the same session, who supplemented his dramatic tale of England Under the Robot Bombs with British Information Services film of Germany's "secret weapon" . . .

The life of Rudolph Diesel, his strange death, and the history of his invention, the diesel engine, furnished fascinating material for talk before **NEW ENGLAND SECTION** Nov. 14 by J. H. Moloney, advertising manager, Detroit Diesel Engine Division, GMC . . . Leading up to the diesel's major part in this war, Mr. Moloney described the details of its birth, its eventual recognition, and finally its worldwide use for such battle aids as submarines, subchasers, destroyer escorts, minesweepers, rescue vessels, tankers, and so forth . . . One of the few remaining vehicles still without a diesel engine is the automobile, and the speaker asserted there is still much experimental work to be done in that respect . . .

November was a two-meeting month for **NORTHERN CALIFORNIA SECTION**, with a field trip to Joshua Hendy Iron Works on the 18th, and regular technical session on the 28th . . . Over 153 SAE visitors participated in inspection tour at the Works, after which they were rewarded with an excellent cafeteria-style dinner . . . Featured talk of Section's second meeting, held in Sacramento, was by J. H. Wasson, Allison Division, GMC, who sketched the evolution of the Allison engine from its early form in 1930 to the present engine, which will develop nearly 1500 hp at the same rpm and weight as the original model . . . Following the next speaker, Major J. J. Owens, McClellan Field, Sacramento, who discussed preliminary aircraft design, was Warren G. Brown, Caterpillar Tractor Co., who reported diesel engine operation under wartime conditions . . . Allison's chief pilot instructor and the evening's scheduled speaker, C. Martin, was unable to attend . . .

Three suggestions for the winterization of automotive equipment were offered at **PHILADELPHIA SECTION** meeting Nov. 8 . . . Infra-red rays will cure rheumatic winter stiffness of bus motor bearings, according to Robert H. Dalgleish, Jr., Philadelphia Transportation Co., who described the use of infra-red heating lamps to maintain a satisfactory starting temperature in bus engines during outside parking of the vehicles . . . Exposition of a test program conducted in laboratory of Atlantic Refining Co. to investigate the application of immersion heaters for the purpose of facilitating engine starting after short or long periods of storage at winter temperatures was the theme of E. P.

*turn to next page*

## TWO MANUALS Undertaken By W. E. B. on Repairing

AT the request of the Office of the Chief of Ordnance, the SAE War Engineering Board has undertaken a project on the Welding and Repair Procedure for Automotive Malleable Iron and another on Welding and Repair Procedure for Steel Castings.

These two reports will be a compendium of the best practices of the malleable and castings industries on the welding and repair of rejected parts to make them satisfy acceptance specifications. A survey has already started on this project.

The material will become a guide to Ordnance inspectors, according to Col. Joseph M. Colby, under whose direction the project is being undertaken. These reports are expected by industry engineers and Ordnance officers to help solve the current bottleneck in the heavy truck program, wherein malleable and steel castings play an important role.

Chairman J. C. Zeder of the SAE W. E. B. assigned this project to R. H. McCarroll, Ford Motor Co., who was also the sponsor of the recent report on the Welding of Automotive Gray Iron Castings, which met with the enthusiastic approval of the Ordnance Department.

The details of the project will be set up by Mr. McCarroll, L. R. Buckendale, Timken-Detroit Axle Co., and J. M. Crawford, Chevrolet Motor Division, General Motors Corp.

## Intense Corrosion-Proofing Research Requested by Army

MORE than 150 experts from universities, the Department of Agriculture, Ordnance officers, and other technicians and scientists representing a wide range of industries are contributing to the SAE War Engineering Board report on Corrosion Proofing of Military Automotive Equipment being prepared for the Ordnance Department.

Case histories on parts seriously affected by corrosion have been prepared by Army officers in the battle zones and the types of corrosion-proofing materials and treatments now being used have been studied. Now, agreement is being reached on the best methods.

The next step is to refer these recommendations to experts in the corrosion-proofing business, for testing the materials and for report.

From the compilation of this work will be prepared a manual containing the optimum corrosion-proofing practices, as agreed upon by the group and its consultants.

The Ordnance Department requirements for corrosion-proofing will be functional, and the proposed manual will provide detailed information about meeting these recommendations.

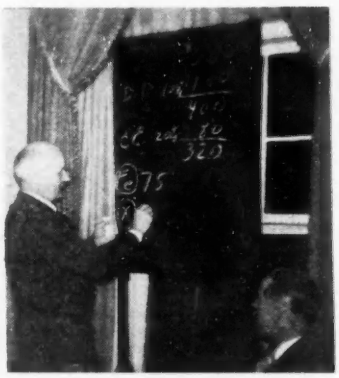
Sponsor is SAE Past-President A. T. Colwell, Thompson Products, Inc., who is chairman of the Steering Committee which is composed of Roy E. Cole, vice-president of Studebaker Corp.; SAE Past-President J. H. Hunt, General Motors Corp.; and J. L. McCloud, Ford Motor Co., who is the general chairman of the Corrosion-Proofing

# Rambling Through Section Reports

**continued from preceding page**

Gohn's paper . . . H. C. Riggs, Electric Storage Battery Co., gave the audience an insight into the work involved in determining starting equipment requirements for gasoline and diesel engines . . . Animated discussion was a pleasing finale to the symposium . . .

No cars made out of celluloid, soybeans and sour milk; and no direct fuel injection were some of the revelations made by SAE President W. S. James before the Nov. 8 meeting of **ST. LOUIS SECTION,** where he toned down many illusions of the post-war car. (Digest of his talk appears on p. 45 of this issue) . . .



**SAE President W. S. James figuring out the price of the post-war car at St. Louis Section, while Section Chairman George C. Davies (right) looks on**

San Diego's bus transportation history during the past 20 years was analyzed at the luncheon meeting of San Diego Group of **SOUTHERN CALIFORNIA SECTION** Nov. 21 by G. W. Shaver, San Diego Electric Railway Co., who spoke on maintenance problems in bus transportation . . . Maintenance and not age is the factor which determines the efficiency of equipment, said Mr. Shaver, declaring that his company now has 200 buses which it maintains in a state of 85% repair . . .

Present fuels for gasoline engine as well as for jet propulsion and rocket powerplants were discussed by Dr. Gustav Egloff, Universal Oil Products Co., at same Section's Nov. 30 meeting . . . Dr. Egloff claimed that 100 plus octane rating for aircraft fuels has been a contributing factor in Allied air supremacy . . . He also compared jet propulsion with the conventional gasoline engine for velocity-economy ratio, where the gasoline engine is more economical at 150 mph; the two powerplants have the same economy at 300 mph; and jet propulsion takes the lead for speeds of 550 mph . . . Future fuels, the doctor said, are gravitating toward the methane or paraffin series . . .

When the Japanese captured 90% of the world's tin supply, industry was forced to develop induction flowing of tin plate, which tremendously reduced the amount of tin used in comparison with the pre-war amount . . . The most widespread application, however, has been the substitution of induction surface hardening for parts formerly either heat-treated throughout or case carburized . . . These ideas formed the basis of a paper on Metallurgical Factors Affecting the Selection of Steel for Induction Hardening by John M. Birdsong and Elbert Hoffman, LaSalle Steel Co., presented to more than 100 persons at **SOUTHERN OHIO SECTION** Nov. 2 . . . Slides served to illustrate the entire lecture . . .

Facts and fallacies of airplane design were set forth by Peter Altman, engineering consultant, at **WESTERN MICHIGAN SECTION** meeting Nov. 16 . . . Emphasis was laid on the correct relationship between weight, size, power and disposable load, and propeller performance came in for special discussion, in which was shown the correct interpretation of the improvement in performance available through the use of controllable pitch propellers and proper design . . . Advantages of this type of propeller in reducing take-off distance, improving rate of climb and ceiling of the airplane were explained, and Mr. Altman demonstrated that with the same power absorbed from the engine, the cruising speed of the airplane remained the same, whether a fixed pitch or controllable pitch propeller was used . . . Army Air Forces film entitled "Aeronautical Oddities" pictured further fallacies in design . . .

## Corrosion Proofing

**cont. from p. 35**

Technical Committee. This group is divided into the Component Parts Division headed by M. R. Denny, General Manager, Overseas Operations, who spent 22 months in the South Pacific since Pearl Harbor, and the Materials & Processes Division, under the chairmanship of V. M. Darsey, president of Parker Rust Proof Co. There are three subcommittees under the Component Parts Division, and a group of committees is being organized under the Materials & Processes Division as needed – depending upon specific problems that are arising as the work progresses.

## Committee Appointments

COMMITTEE personnel whose appointments have been approved by the Council include:

A. P. Elebash, Pan American Airways Inc., who has been named a member of the SAE Air Transport Engineering Activities Committee;

R. R. Janssen, North American Aviation Inc., who succeeds L. P. Spalding, with the company, to the Airframe Materials & Processes Committee and the Aircraft Accessories Materials & Processes Committee, divisions of the SAE Standards Committee;

Iron & Steel Division appointments as follows:

Elmer Larned, Youngstown Sheet & Tube Co., to Panel A – Steel Producers, replacing O. W. McMullan, Bower Roller Bearing Co.

Jesse J. Shuman, Jones & Laughlin Steel Corp., has been named a member of the same panel;

A. W. F. Green, Pratt & Whitney Aircraft Corp. of Mo., to Panel C – Aircraft, succeeding N. E. Woldman, Bendix Aviation Corp.; and

O. W. McMullan to Panel I – Bearings, replacing E. U. Blanchard, also with Bower Roller Bearing Co.

# SAE Aids Army on Drafting Manual

SAE Committee E-8, meeting in the Board of Directors Room of Packard Motor Car Co., Detroit, Oct. 23 and 24, was requested by the Working Committee of the Army-Navy Aeronautical Board to review a draft of the new aeronautical drafting room manual of the Services and to reconsider a few points wherein the Services differ with the SAE Manual of Aircraft Engine Drafting Room Practice. Members of the SAE committee present are shown below:

**Front row (left to right):** Ralph S. Kellogg, Packard Motor Car Co., and Major B. S. Spano, AAF, Working Committee, A-N Board. **Rear row (left to right):** E. W. Rentz, Jr., SAE staff; Chairman J. G. Perrin, Pratt & Whitney Aircraft; Paul V. Richards, Wright Aeronautical Corp., and John G. Schweiger, Ranger Aircraft Engines. Members absent when the photograph was taken are Horace W. Eplee, Lycoming Division, The Aviation Corp., and Carl R. Reynolds, Allison Division, General Motors Corp.

# APPLICATIONS Received

**The applications for membership received between Nov. 10, 1944, and Dec. 10, 1944, are listed below. The members of the Society are urged to send any pertinent information with regard to those listed which the Council should have for consideration prior to their election. It is requested that such communications from members be sent promptly.**

***Baltimore Section:*** John B. Black, Wil- Warren Collins, Alfred H. Harley, orge Richard Miller, William H. Nahm, n L. Savage.

***Buffalo Section:*** LeRoy J. Bisson, Hor- A. Taylor.

***Canadian Section:*** Hugh W. Gregory, eph G. Hoba, Albert B. Rupert, Norman ivan.

***Chicago Section:*** Cecil N. Bentley, harles Howell Brunell, Virgil L. Gunder, rnest William Hedeen, Jr., Norman F. indle, Elmer Larned, A. W. Mall, Samuel J. McCutchen, Edward H. Monroe, Wil- m Chenault Thompson, Joseph L. Tourte- , Earl L. Schofield, George J. Sorokin.

***Cincinnati Section:*** Maurice W. Mc- han, Arthur J. Sikora.

***Cleveland Section:*** William J. Bor- hardt, M. Lowell Edwards, Albert L. Jacobs, el W. Kuckuck, Wayne Emerson Martin, eorge Robertson Miller, Verne F. Nelson, arver E. Neville, William C. Rastetter, M. B. Ruth, Richard Vollmer, Edmund M. Wagar, Frank Chester Wisnieski, Edward olf, Jr.

***Detroit Section:*** Noah L. Alison, Glen A. Bassett, John S. Bertling, Hans A. chringer, Glenn M. Brown, William Irvin Chapman, Raymond W. Drobisch, Robert Max Ehlert, Harry Veiling Elkner, Lt. Michael T. George, Edmund J. Godin, Harry Kenetz, Jr., Clifton D. Lowe, Carroll J. Lucas, Alexander A. McCormack, Hugh D. McKinnon, Cornelius McMenamy, Richard O. Printer, Donald Arthur Reynolds, James Joseph Rodak, Loren C. Sackett, Carl H. Schuerman, Jr., Elmer G. Schubert, John H. Stoner, Robert Frederick Summers, Roy P. Trowbridge, George Vlaich, Eric R. Weber, C. W. Wiedfall.

***Indiana Section:*** Floyd H. Dreyer.

***Kansas City Section:*** Chester E. Beck, George C. Prill.

***Metropolitan Section:*** Milton H. Clapp, Edward N. Cunningham, Wilfred R. Gros- er, Capt. Fred A. Jacoby, Henning Karlby, Wallace MacWilliam, Walter H. Skidmore, Carmen Stra, David Wark, Everett C. Wingett.

***Milwaukee Section:*** Herbert N. Hartz, Arnold J. Ristow, Charles M. Zimney.

***Mohawk-Hudson Group:*** Edward J. Edwards, David C. Prince.

***New England Section:*** Wayne Harold Brown, Walter T. Devine.

***Northern California Section:*** Glenn C. Beever, James A. Blayney, Lt. Wilhelm Sydow Everett, John C. Garden, Harold L. Graven, Lt. Ernest Alexander Magyar, Robert H. Miller, Jr., Edward C. Nissen, Edgar William Prahser, Ernest Seymour Starkman, Charles Paul Steinmetz.

***Northwest Section:*** Edwin N. Grubbe, Gaylord Weld Newton, Gerald A. Fisher, Lowell S. Norman, H. R. Pinkerton.

***Oregon Section:*** Frank Costanzo, Earl Edward Geisler, Harvey Byron Van Raden.

***Peoria Group:*** Raymond Zanes Brown, Albert C. Neubauer, Francis J. Rother, Robert Bruce Underwood.

***Philadelphia Section:*** Carl A. Jacobson, Major Stanley McLay, Frank N. Piasecki, Virgil W. Ware.

***Pittsburgh Section:*** Elmer C. Johnston, William J. McCahill, Joseph F. Stoeckle.

***St. Louis Section:*** Christy Clair Butterworth.

***Salt Lake City Group:*** Ernest Reynold Donner.

***Southern California Section:*** Luther I. Blunt, Frederick William Dadson, Richard J. Graebner, Howard E. Gray, Howard E. Hamilton, Alvin P. Hudson, John Intlekofer, John W. Kochendorfer, Frank L. Landon, T. H. Marsden, Eyre Massey, Donald J. Naumann, Nathan Newby, Jr., Victor J. Plotkin, A. Robertson, Raymond B. Stringfield, William C. Wold, O. L. Woodson.

***Southern New England Section:*** Howard Wallace Butler, Carl W. Bettcher, Norton Dale Eagon, J. Owen Eames.

***Southern Ohio Section:*** James Glen Blackwood, Allan Curtis Hoffman, F. E. Lehman.

***Spokane Group:*** J. R. Bryan, John J. Clapp, Donald M. Grimes, William S. Hamilton, Walter Chris Hoegh.

***Texas Section:*** Dick E. Bredeson.

***Twin City Group:*** Ralph Erving Jones.

***Washington Section:*** Leon J. LaFontaine, Raymond G. Olson, Henry L. Prince.

***Western Michigan Section:*** Robert W. Hasper, Charles Locke.

***Wichita Section:*** Everett H. Lock, Clarence Elton Swafford.

***Outside of Section Territory:*** Fred O. Bonnell, E. M. Lowery, Sr., Thomas Herbert Randall, Jr., John V. Johansen, W. Kermit Rice, William Pearce Sansom.

***Foreign:*** Ernest Ambler, England; Francis Grimsdick Clarkson, England; Dennis Coates, England; Philip Edward Irving, England; James Arnold Latham, England; Lt. Robert Ian MacClure, England; John Randall Nutter, England; Richard Pentony, England; John Clement Sanford, Australia.

# NEW MEMBERS Qualified

These applicants who have qualified for admission to the Society have been welcomed into membership between Nov. 10, 1944, and Dec. 10, 1944.

The various grades of membership are indicated by: (M) Member; (A) Associate Member; (J) Junior; (Aff.) Affiliate Member; (SM) Service Member; (FM) Foreign Member.

***Buffalo Section:*** James W. Boyd (M).

***Chicago Section:*** Barber-Colman Co. (Aff.), Reps: Ralph L. Cotta, Louis C. Plaehn. Maurice Eugene Foster (J), Arthur L. Houart (A), Robert Michael Ladevich (J), Samuel J. Lee (A), Jack Edgar Bo... man (J).

***Cleveland Section:*** Wayne M. Ca... ton (A), Howard W. Crusey (J), Wesley ... Steyer (M), Max Joseph Tauschek (J), W... liam Jesse Voss (J), Frank E. Zamecnik ...

***Detroit Section:*** Elmer J. Barth (M... Bowling Green Rubber Co. (Aff.), Re... Robert Roberts. Wilfred A. Bychinsky (M... Paul M. Clayton (M), A. C. A. Neyra... deWilde (M), James W. Greig (M), Carl ... High (M), James Carlisle Hughes (J), Ca... Arthur A. Parquette (J), Delbert E. Stu... (M), Capt. Resat Taykut (F M).

***Indiana Section:*** John Marion Mart... (J), William Siler (M).

***Metropolitan Section:*** A. B. Aer... transport-Swedish Intercontinental Airlin... (Aff.), Reps: Karl-Henrik Larsson, Tore H... Nilert. Clark R. Bennett (A), George Hen... Compter (M), John S. Greene (A), J. E... Hardy (A), Albert B. Jacobs (A), Berthol... A. Lindner (M), Lt. Stanley H. Lowy (J)... Roger J. Metzler (J), Joseph Mioduszewsk... (J), Harold D. Morehouse (A), Motor Haul... age Co., Inc. (Aff.), Reps: Roy Forsma... Leffert B. Krummel, Daniel O'Connor... Henry John Schaefer, William James Sum... merfield. Jules Rafalow (J), Victor H. Scal... (A), Major John C. Thompson (A), Pa... Howard Wilkinson (M).

***Mid-Continent Section:*** J. Larry An... derson (A), Thomas C. Davis, Jr. (J).

***Milwaukee Section:*** Fred A. Loeb... (J), Robert E. Shumway (A).

***Mohawk-Hudson Group:*** Edward G... Haven (A), Andrew N. Smith (J).

***New England Section:*** Christian E... Grosser (M), Frank W. Marshall (A).

***Northwest Section:*** Arthur A. Black... ler (A), Rex D. Rowland (A).

***Philadelphia Section:*** Robert E. Jef... fries (J), Irving P. Polak (J), Earl W... Slaughter (A).

***St. Louis Section:*** August H. Blattner... (M), C. B. Fites (M), Clifton K. Travis (A)...

***Southern California Section:*** Thomas... Matthew Dahm (M), Marshall Headle (M)... George S. Howell (A), Peter R. Kyropoulos... (M), Major Charles W. Mills, Jr. (S M)... Robert William Perusse (J), George A... Powell (A), William Leroy Sullins (J).

***Southern New England Section:*** W... E. Neverette (A), G. Douglas Rice (J).

***Southern Ohio Section:*** William John... Helfer (S M), Frank McLean Mallett (M)... Jack Guy Mencaccy (M).

***Texas Section:*** Glen G. Gale (J). Boyce... Nelson (A).

***Twin City Group:*** W. J. Raleigh (S M)... J. J. Von Edeskuty (A).

***Washington Section:*** John B. Hake... (A), Boris Lomonossoff (J).

***Outside of Section Territory:*** Capt... Clem C. Bauman (J), Richard Alfred Bat... (A), Alberto Bombarda (A), Howard C... Davis (J), George M. Eveleth (M), Franz P... Kaiser (M), Walter W. Kovalick (J), J. H... Merritt (J), 2nd Lt. William Mitchell Rit... (J).

***Foreign:*** Col. Tom Leslie Collier (F M.)... (Central Mediterranean Forces), Sternol, Ltd... (Aff.), Rep: Alfred Leonard Read (En... gland)

## About SAE Members

cont. from p. 32

ELEANOR ALLEN, technical editor of *SAE Journal*, recently was admitted to the New York Bar, following her graduation from Brooklyn Law School in June, 1944, with the degree of Bachelor of Law. She will continue her position on the SAE staff.

ARTHUR W. JUDGE, consulting engineer in Surrey, England, has presented the third edition of his book "The Testing of High-Speed Internal-Combustion Engines" (Chapman & Hall, Ltd.), in revised and enlarged form. In describing the various testing devices and systems in use from the earliest days of the internal-combustion engine to the present, Mr. Judge provides a clear picture of the work of high-speed engine designers, and he has added to this edition the considerable developments in testing methods and appliances. Throughout the 458 pages, in which there are 375 illustrations, the apparatus for every test is explained fully.

LT.-COL. WILLIAM B. DROGE, U. S. Army Ordnance Department, has been transferred from Headquarters, Air Technical Service Command, Wright Field, Dayton, Ohio, to Headquarters, Fort Sill, Okla.

Formerly chief, Plastics Bureau, War Production Board, Washington, D. C., CLINTON RECTOR is now general sales manager, Catalin Corp., New York City.

I. W. BEALER, formerly with Ford Motor Co. as engineering supervisor on Pratt & Whitney Aircraft engine program, has become chief engineer, American Sand Blast Co., Detroit.

HARRY S. EGERTON is now layout draftsman (senior) experimental engineering, Sikorsky Aircraft Division, United Aircraft Corp., Bridgeport, Conn. He had been group leader, preliminary design, Kellett Aircraft Corp., Upper Darby, Pa.

P. M. HELDT, author and publisher, has recently issued the second edition to his book "Torque Converters or Transmissions," which is a study of automotive transmissions of every type—mechanical, hydraulic, electric, pneumatic, differential; stepped and continuously-variable; and hand-controlled, automatic and semi-automatic. This edition differs from the first only in that an appendix has been added which deals with a number of transmission topics not touched on originally, and which rounds out the information contained in the book in a thorough and easily understood manner. P. M. Heldt, Nyack, N. Y., is the publisher.

KARL SCHRICK, JR., formerly diesel erector, General Machinery Corp., Hamilton, Ohio, is now designing engineer, Philip Carey Mfg. Co., Cincinnati.

HERMAN C. SEFFKER is now superintendent of maintenance, National City Lines, Chicago. He was formerly employed by Bee Line, Inc., Rockville Center, L. I., N. Y., in the same capacity.

GORDON C. SEAVEY, formerly specification engineer, Aircooled Motors Corp., Syracuse, N. Y., has joined the staff of M.I.T. as mechanical engineer.

JOHN R. DEFFENBAUGH is now a draftsman for Premier Gear & Machine Works, Portland, Ore. He had been general superintendent, War Department, Vancouver Ordnance Service Command Shop, Vancouver Barracks, Wash.

DON R. KEATON, previously plant superintendent, Whirlwind Lawn Mower Corp., Milwaukee, is now president of Keaton Mfg. Co., same city.

EDWARD C. HOENICKE, assistant to the general manager, Foundry Division, Eaton Mfg. Co., Detroit, has been named chairman of the publicity and education committee of the Gray Iron Founders' Society for the third successive year.

ROBERT L. SCOTT, formerly traffic safety engineer, General Insurance Co. of America, Seattle, Wash., is now general manager, Lake Shore Stage Lines, Tacoma, Wash.

MAJOR L. S. REEVES, deputy director, Supply Division, and chief, Maintenance Branch, Fort Lewis, Wash., is now on leave at his home in Los Angeles. He will revert to inactive status and be promoted to lieutenant colonel, inactive reserve.

Urging serious consideration be given to increasing the present 96 in. width of motor trucks to 102 in., SAE Past-President **B. B. BACHMAN,** vice-president of the Autocar Co., presented a study on "Some Engineering Aspects of Future Motor Truck Design" before the American Association of State Highway Officials, Nov. 29, at Cincinnati. The presentation was prepared for review by the Motor Truck Committee of the Automobile Manufacturers Association, and thus was an industry viewpoint. The 102 in. width suggested, Mr. Bachman said, would "make it possible to build safer and more serviceable trucks in permitting valuable improvements in tire, spring and brake mounting, and would provide for developments which past experience teaches us the future will bring." Among the collaborators on the study were **EVERETT WAIT ALLEN,** GMC Truck & Coach Division, and **J. M. CRAWFORD,** Chevrolet Division, General Motors Corp.; **B. FRANK JONES,** White Motor Co.; **CLARENCE A. PIERCE,** Diamond T Motor Car Co., and **FRED L. SAGE,** Chrysler Corp.

GEORGE B. FRAUMANN is now technical adviser of automotive parts, Foreign Economic Administration, A. P. O. 627, c/o Postmaster, New York City. He formerly had the same position with China Defense Supplies, Inc., Washington.

C. R. ROGERS has joined Oliver Farm Equipment Co., Chicago, as a consulting engineer. He had been chief engineer of the gas power engineering department, International Harvester Co., Chicago.

Previously production engineer, Zenite Metal, Indianapolis, GEORGE W. SCHACHT is now time study engineer, Basca Mfg. Co., Inc., same city.

REX ALLBRIGHT, who had been project engineer, Detroit Diesel Engine Division, GMC, is now with Clark Equipment Co., Battle Creek, Mich., as assistant to the chief engineer.

HAROLD W. SLAUSON, former chairman of the SAE Metropolitan Section, has been elected lieutenant commander of the Westchester group of the United States Power Squadrons, a national organization which is interested in the educational and practical phases of boating and navigation.

CLARENCE J. GLANZER, formerly assistant chief engineer, Air-Maze Corp., Cleveland, has been appointed chief engineer of the company.

W. G. ROBY has been promoted from vice-president and general manager, to president, Cinch Mfg. Corp., Chicago.

Previously chief engineer, Westinghouse Air Brake Co., Wilmerding, Pa., C. D. STEWART is now director of engineering.

O. H. LOVELACE, formerly designing engineer, Canadian Co-operative Implements, Ltd, Regina, Sask., Canada, now has the same position with National Farm Machinery Co-operative, Inc., Shelbyville, Ind.

PAUL MYRON is no longer with Pesco Products Co., Cleveland, as design engineer, having joined Air-Maze Corp., same city, as mechanical engineer.

LT.-COL. JOHN K. HAMPTON, U. S. Army Air Forces, has been transferred from the Nashville (Tenn.) Area Office, to Atlanta, Ga., where he is stationed as chief of the Property Disposal Section, Southeastern Procurement District, Air Technical Service Command.

HERMANN K. INTEMANN, formerly sales manager, Halowax Products Division, has been appointed assistant general sales manager, thermoplastic department, Bakelite Corp., both subsidiaries of Union Carbide & Carbon Corp., New York City.

SAE members who have received recent changes in company status include: **WILLIAM S. THURLOW,** Standard Oil Co. of Calif., has been transferred from the San Pedro (Calif.) to the Portland (Ore.) branch; **L. H. PERRY,** S. K. Wellman Co., from New York manager to sales promotion manager in Cleveland; **LEWIS F. MOODY, JR.,** automotive engineer, Socony-Vacuum Oil Co., Inc., from the Research & Development Division, Paulsboro, N. J., to the lubricating department, New York City; **WALTER H. KLUCK,** Curtiss-Wright Propeller Division, from the Indianapolis to the Caldwell, N. J. branch; **HEINRICH SCHNEIDER,** partner of Schneider Bros. Co., has moved from the Hamilton, Ohio office to the Chicago branch; **CHARLES N. PITTS,** Wright Aeronautical Corp., Paterson, from test engineer to production liaison engineer; **FORREST F. MUSGRAVE,** Lubri-Zol Corp., from assistant to the director of research, Wickliffe, Ohio, to technical assistant to the president in charge of standards and specifications, Cleveland; **WILLIAM F. LITTLE,** Electrical Testing Laboratories, Inc., New York City, from engineer to head of the photometric department.

Also, **N. F. VANDERLIPP,** Curtiss-Wright Corp., from factory manager in Columbus, Ohio, to general manager in Buffalo; **C. E. McTAVISH,** Perfect Circle Co., Ltd., Leaside, Toronto, Ont., from general manager to vice-president and general manager; **CHARLES D. LONG,** De Havilland Aircraft of Canada, Ltd., Toronto, Ont., from chief inspector to chief production designer; **R. C. LOOMIS,** Transcontinental & Western Air, Inc., from engineering supervisor, Intercontinental Division, Washington, to superintendent of development, Kansas City, Mo.; **JOSEPH RZECZYCKI,** Fairchild Aircraft, Ltd., Longueuil, Que., from the tool and process engineering department to factory cost estimating supervisor; **ARTHUR B. OLMORE,** Adel Precision Products Corp., Burbank, Calif., from project engineer to group leader.

**PAUL M. MAY,** who had been experimental and test engineer, Lycoming Division, Aviation Corp., Williamsport, Pa., is now assistant division engineer, Aerojet Engineering Corp., Pasadena, Calif.

**DAVID L. BERRY,** who had been connected with Shell Oil Co., Inc., Wood River, Ill., is now an ensign in the U. S. Navy, and may be reached at the Bureau of Aeronautics, Navy Department, Washington, D. C.

**EMERY ROSSNER** has recently become affiliated with Milford Crane & Machine Co., Milford, Conn., as an engineer.

**LEONARD TROY** is now in the U. S. Army, stationed at Camp Wheeler, Ga. In civilian life he was aeronautical engineer, Spartan Aircraft Co., Tulsa, Okla.

**JOHN A. STERRETT,** who had been president and general manager, Sterrett Operating Service, Inc., Washington, is now with Foundry Rubber Compounds Corp., same city, in a similar capacity.

**CHARLES F. STEIN** has been appointed general manager of Tri-Clover Machine Co., Kenosha, Wis. He had been vice-president, Quaker Stretcher Co., same city.

**LT. LESLIE R. PARKINSON,** USNR, who had been associate professor of aeronautical engineering, North Carolina State College of Agriculture and Engineering, before entering the service, has, in his recently-published book, "Aerodynamics," written an up-to-date presentation of the science of flight. Both elementary and advanced phases of the subject are covered with a minimum of mathematics. What is known on the important topic of dynamic stability is reviewed, and the stability of an airplane is explained in simple terms. Practical information on engineering flight tests is given, and there are full tables for reference in this highly-useful book, published by MacMillan Co., New York City. Lt. Parkinson is now doing special work for the Naval Aircraft Factory in Philadelphia.

**RONALD C. BECKETT,** formerly powerplant engineer, Chrysler Corp. of Canada, Ltd., Windsor, Ont., is now chief engineer for Kralinator Products, Ltd., Preston, Ont.

**JOHN V. CURTS** has left John Inglis Co., Ltd., Toronto, Ont., where he was mechanical engineer in charge of plant lubrication and machine inspection, to become senior engineer of Turbo Research, Ltd., Leaside, Ont.

**ALEXANDER SATIN,** who had been assistant chief of structures in charge of structural design, Avion, Inc., Los Angeles, is now aircraft structures engineer, Northrop Aircraft, Inc., Hawthorne, Calif.

**FREDERIC R. SPEED** has been named technical editor of *Motor* in New York City. He had been engineering consultant, Internal Combustion Engine Bureau, War Production Board, Washington, D. C.

**THEODORE J. GARDOCKI,** previously plant and experimental engineer, Koster Specialty Mfg. Co., Inc., New York City, is now resident inspector of ordnance, Army Service Forces, New York Ordnance District.

Formerly assistant inspector, Grade 1, Ministry of Aircraft Production (Ford Motor Co.), England, **THOMAS N. L. PUGHE** is now British liaison representative, Packard Motor Car Co.

**R. L. BRADSHAW** is now an examiner for Reconstruction Finance Corp., Portland, Ore. He had been field property officer, U. S. Treasury Department, Procurement Division, Federal Property Bureau, Seattle, Wash.

**L. M. K. BOELTER,** formerly professor of mechanical engineering, University of California, Berkeley, is now dean of the College of Engineering, University of California, in Los Angeles.

**RICHARD L. ACTON** is no longer district manager for L. H. Gilmer Co., Minneapolis, having been named sales manager of Minnesota Bearing Co., same city.

**JOHN J. GRABFIELD,** formerly layout draftsman, Powerplant Group, Otis Elevator Co., New York City, is now a member of the technical staff of Bell Telephone Laboratories, New York City.

Formerly associate engineer, U. S. Army, St. Louis Ordnance District, **ALFRED F. STOEHR** is now lubrication engineer, Cities Service Oil Co., St. Louis, Mo. Mr. Stoehr is treasurer of the SAE St. Louis section.

# Technical IDEAS for ENGINEERS

**Briefed from Papers Given at SAE Meetings**

## Aviation Progress Presages Half-day NY-London Flights

by **CHARLES FROESCH**
**Eastern Air Lines, Inc.**

**Mohawk-Hudson Group, Sept. 11**

*(Excerpts from paper entitled "The Influence of Air Power on the Future of America")*

THERE are generally three principal questions asked about future air transportation, and these are: (1) How fast are we going to fly? (2) How high will we fly? (3) How large will our future air transports be?

As far as speed of flight is concerned, this will depend on the type of service rendered. The problem is how fast can we afford to go profitably without sacrificing safety, reliability, and utility. Domestically speaking, there seems to be no great gain to be obtained by flying over 300 mph, at which rate we would leave New York at 11 o'clock at night and arrive at Los Angeles for early breakfast the next morning.

Globally speaking, speed becomes much more important. We can foresee average speeds of 400 mph and even higher as we efficiently apply the advances in flying and airplane design obtained during the war. This will mean an 8-hr flight to London and one day from New York to Buenos Aires.

I believe we can envisage considerable progress in speed as well as utility of heavier-than-air flying machines. Astonishing results can be obtained by the use of new strong materials, many of them of the plastic type, as lightness and superior strength are the two basic characteristics of the airplane. We may also see jet propulsion; or certainly a combination of our present propellers and jet propulsion will provide a substantial speed increase.

The most desirable altitude at which airplanes will fly will depend on the type of operation. If the distance between stops is short, up to 300 or 400 miles, there is nothing to be gained by climbing up to 15,000 ft. If the distance is 700 miles or more, then it becomes most economical to fly as high as possible. However, a point is reached where any further increase in speed means a reduction in payload.

The most economical altitude for long-range operation is about 25,000 ft. Flying at such height will require a difference in pressure between the outside air and that of the air in the cabin of, roughly, 3 psi, or 432 lb per sq ft. This presents a weight structure problem, but it is not insoluble. The weight increase is about 4% for a 100,000-lb airplane, for an 8000-ft cabin pressure at 25,000-ft flight altitude, and this represents a substantial payload reduction which must be offset by at least a proportional speed increase. Another problem which the engineer must watch is that as the plane goes higher and higher the air density gets lower and lower and a point is reached where the speed increase is insufficient to provide the necessary wing lift. Calculations again show this to be from 25,000 to 30,000 ft for maximum commercial economy.

Regarding the size of airplanes, there seems to be no limit structurally as to what the designer can conceive and the shopman can fabricate. Domestically, a 50- to 60-passenger capacity is about the largest size

which will be required for some time, as frequency of schedule is of far greater importance than capacity. However, we shall undoubtedly see 100-passenger airliners flying from coast-to-coast, particularly in overnight service.

When it comes to international operation, frequency of schedule becomes of secondary importance. We can look for 100-, 200-, and even 500-passenger airplanes flying from New York to London or Paris, or San Francisco to China and Australia.

All these various types of airplanes will follow conventional design, as any violation of the laws of nature will meet with disastrous results.

The helicopter, which is not yet ready for commercial production, seems to be definitely limited in size as well as maximum speed. Its most useful field will be that of taxi service and specialized applications, such as coast patrol, police work, crop dusting, forest fire detection, and ambulance service. However, it may be found in air transport service later.

The present extensive use of air transportation in military operation for cargo and personnel portends a tremendous expansion in commercial aviation after the war. To enable the normal growth of such air traffic, provisions must be made for airports, and the development of a national airport program must be based on sound economics. ... must be conceived in the light of immediate post-war needs with ultimate realization to allow the best possible air service for each community.

In planning for larger air terminals, ... must contemplate the use of transport ... planes having at least 200-ft wing span and 160-ft overall length. Minimum runway length required for local schedule operation ... airplanes will vary from 3000 to 3500 ft. Similarly, limited stops schedule equipment will need 3500- to 4500-ft runway length, and long-range airplanes will require from 6000 to 10,000 ft, depending on the distance to be covered without stopping.



## . . . DYNAMIC LOADS Affect Structural Design of Aircraft


**by R. L. SCHLEICHER**
***North American Aviation, Inc.***



▪ *1944 National West Coast Aeronautic Meeting*


(*Excerpts from paper entitled "A Current Outlook on the Effects of Dynamic Loads on Aircraft"*)

DYNAMIC loads produce stresses which vary between the ultimate strength and fatigue limit. Large dynamic loads may cause instantaneous failure, while low dynamic loads produce a more gradual ... integration. Generally, these dynamic forces may be classified according to their direct effects on the structure; namely, those causing large amplitudes at low frequency (less than 2000 cpm), and those causing small amplitudes at high frequency (2000 to 20,000 cpm).

Let us consider the principal examples of large dynamic loads occurring at low frequency. First, there are landing loads. In conventional aircraft, prior to the war, a rigorous treatment of the dissipation of the impact forces was not necessary. With the introduction of the tricycle landing gear and larger aircraft, however, it was found that the impact force drag on the main gear was of such duration as to excite natural frequency in the bending of the horizontal tail surfaces. This, coupled with rotational effects, caused instant failure. This problem has been removed from a case of pure static ...

Another problem new to landing gear design is that of "chatter," brought about by impact drag forces exciting the nose wheel structure in bending. Taxiing over rough ground has also contributed to fatigue failures from this cause.

Then there are gust loads, in themselves quite severe, but their period seldom, if ever, has excited any portion of the primary structure. The same is true of flight maneuvers. Though the application of these dynamic loads more nearly approaches static conditions, the susceptibility to fatigue failure must be reckoned with. Especially is this true in heavily loaded transports and bombers.

Peculiar to military aircraft are the problems of gun recoil loads, which have been responsible for failures in many installations.

nul forces in themselves are a direct func- of the elasticity of the support. In d gun installations undue flexibility can- be tolerated. Also, it is imperative that natural period of the supporting struc- must not lie in range of the rate of In order to achieve accuracy, fixed s must be mounted on rigid supports ing a high natural period. Thus, it is enough to design a gun installation especially a turret installation) for ic strength or resistance to fatigue. It st also be designed to maintain its natural iod above the rate of fire expected of the apon installed.

To replace the ignorance in structural de- n prevalent a few years ago, there is now oming available an abundance of test a which will enable the structural engi- er to make more accurate analyses in the ure. In the treatment of high-amplitude, w-frequency dynamic loads, the first pro- dure is to make a static analysis of the ucture, which must be augmented by an alysis which will take into account the fects of impact loads.

In the second classification of dynamic ads, there are small amplitude, high-fre- ency conditions, arbitrarily defined as the 00- to 20,000-cpm range. Structural re- onse to engine excitation becomes impor- nt in high-performance airplanes having atly increased power. Detrimental engine citation on the aircraft structure and ap- rtenances attached to the engine or engine ount are not only a function of the normal gine rpm, but low-amplitude vibrations ay also be excited by second-order, 2½- der, third-order, and 3½-order vibrations. tigue failures ordinarily found in the at- hment of engine accessories, in engine wling, mounts, and the forward portion of selages are nearly always the result of cond- and third-order vibrations. Due to eir high frequency, resulting stresses ap- uach fatigue stresses of the material, and will be necessary to devote more attention the life expectancy of such parts in the ture.

Aerodynamic forces due to the slipstream e another source of high-frequency loads. hese loads are imparted to such items as e propeller spinner, cowling, and even tail rfaces if they lie in the wake of the pro- eller. The spinner is excited principally by e higher-order engine excitations, as well s by aerodynamic forces present at that oint. Tail surfaces are affected by slip- tream effects, which induces in the structure equencies of a higher order; these have d to fatigue failures, mainly in the design f hinge brackets and their attachments.

Gun blast effects, another example of this econd classification, are serious in their con- equences in that fatigue failures result very apidly, and these may vitally affect the trength of the structure. Thin sheet cover- gs in close proximity to the blast are sub- ected to a high-frequency system of forces hich are sufficient to crack the skin and hereby render it useless as a shear-carrying nedium. Skin-supporting structure, such as tringers and frames, also suffer from these ffects. These failures are all highly ac- elerated cases of fatigue and have been known to begin after a relatively few rounds have been fired.

So far, treatment of low-amplitude, high- requency dynamic loads has been through xperimental stress analysis, although ad- anced methods of stress analysis with par- icular emphasis on the determination of he elastic curve are now being developed.

# *Aircraft Now Essential Equipment For Mining Operations in Canada*

**by W. J. McDONOUGH**
**Central Aircraft Mfg. Co., Ltd.**

▪ **Canadian, Nov. 15**

*(Excerpts from paper entitled "Canada's Aircraft Industry")*

THE rapidly increasing pace of mining development in Canada in 1928 caused the demand for air transportation so to exceed the supply that several of the more prominent mining companies formed subsidiary organizations to handle their needs in this field.

By the summer of 1929 three mining companies operated a combined fleet of 18 aircraft which had traversed the Dominion from Labrador to Alaska, and from Toronto to the Arctic Islands in search of commercial mineral deposits.

Types of aircraft in use then were the Fokker Super-Universal and Fairchild cabin

types, reliable but slow and ill-equipped to deal with bad weather conditions.

The first serious attempt to produce aircraft suitable for operating in the Canadian North was made by the formation of Fairchild Aircraft, Ltd., in 1929. The prototype Fairchild FC2 installed with the 180 hp Wright Whirlwind subsequently proved in the form of the Fairchild Type 71 to be an efficient aircraft for Canadian conditions, and this, with the Fairchild 82, were widely used for years by the Air Force. This type met with little competition until the advent of the Noorduyn Norseman in 1936.

The early 30's witnessed the beginning of a program providing Canada with a chain of landing fields to be laid out at regular intervals from coast to coast, in preparation for a transcontinental air service then in the chrysalis stage. Sponsored and directed by the Department of Transport, it was a pioneer undertaking of the first magnitude, and the development of the Canadian Transcontinental Airways deserves special mention in the Dominion's aircraft history.

In the meantime, in the commercial sense, Canadian aircraft industry dozed peacefully under the umbrella of a high tariff that protected little and prevented the purchase of suitable equipment badly needed to further the development of the country's natural resources. This was the state of affairs in 1938, when a mission from the British Ministry arrived in Canada to investigate additional possibilities of aircraft manufacture in this country to augment the already strained resources of Great Britain. Associated Aircraft was formed following negotiations, the main function of which was to accept a contract to provide Britain with an urgently needed, and at that time, first-line aircraft, the Hampden Bomber. The company dissolved owing to failure of mutual collaboration.

Six years before 1939, the average annual employment in Canadian aircraft industry was about 500 people, and the average sales over this period was about $2,000,000 per year. In 1938, with the advent of British contracts, employment had risen to a total of about 3000 employees with a capital expenditure increased to about $8,000,000.

Finally, in 1940, Canada's aircraft production was shocked into activity by the appointment of a controller to the production program, who immediately restored the industry's long lost energy.

By the Spring of 1941 over 100 primary training aircraft were being produced each month, and great things were being accomplished by Canadian Car & Foundry at their Fort William plant in connection with the Hurricane contract, and the Canadian Associon was approaching the starting gate. Despite every vicissitude, the program to produce this essential twin-engined trainer was forced to a successful conclusion in time for this all-Canadian product to take its place in the forefront of the British Commonwealth air training plan.

September, 1941, saw the placing of a contract for the building in Canada of the De Havilland Mosquito Fighter Bomber, and one year later the first Canadian-built Mosquito was successfully test flown.

In January, 1942, arrangements had been made for National Steel Car at Malton, now Victory Aircraft, to manufacture the four-engined Lancaster Bomber for delivery to Great Britain. It made its first flight on Aug. 4, 1943, only 16 months after the first drawings were received.

The conversion of Canadian aircraft industry from its past role of improvidence to its present position of world prominence must hold some hopes for the future, and I will never believe that any Government will stand idly by and permit the extinction of an industry that has influenced greatly the course of this war. Unfortunately, there is every indication that history will repeat itself and that the period following this war will be similar to that following World War I. If so, Canadian aircraft industry will undergo a supreme struggle for existence based on the reasoning that the industry must have a market for its products and supply this market on a competitive basis. There will only be a small percentage of aircraft which Canada is equipped to produce which will find such an outlet.

I believe the most prolific source of business for Canada's post-war aircraft industry is through the development of her natural resources. To further this development, we must have airplanes of the right type, and plenty of them. This can be accomplished by initiative, determination and perseverance.

However, I predict almost certain extinction for the industry unless there is a complete revision of the present confiscatory tax application and indifferent fiscal policy affecting the contractual position of every aircraft manufacturing company in Canada.

# OST-WAR CAR . . .
## iewed As Sleeker,
## ut Little Cheaper

**▪ St. Louis, Nov. 8**

*ummary of talk by SAE President W. S. mes on "The Post-War Car" by St. Louis ction Field Editor G. C. Hazard, manager, chnical department, industrial lubrication, Socony-Vacuum Oil Co.)*

IGHLIGHTS of SAE President William S. James' talk to over 125 members and ests of the St. Louis Section at the Forest rk Hotel, St. Louis, Nov. 8, included pre- ctions that:

We will have slick-looking, well-streamed post-war cars of superior gasoline leage, with 4-speed, semi-automatic transissions. They will not be of radical mechanical design, because the present safe and ghly-reliable designs are the result of 40 ars of bug-chasing, squeak-squelching and ear-reducing.

It will take fewer man-hours to produce car after the plants really get going, but rs will probably cost a little more than the 42 models. The American public wants e-room, head-room, accessories, nice apearance, good riding comfort and high performance, and these will require a large dy. Some makes will emphasize high performance, others will give lower accelerations and better gasoline mileage.

Mr. James, chief engineer of Studebaker Corp., pointed out also that we have had 500 cars in the past and will have them in the future when the public wants them. But the public wants as a minimum a car nearly as good as a Cadillac, and this cannot be produced for $500.

If the sales price were $500, the 20% average dealer's discount brings this to ..... $400

Commercial expenses and sales promotion would be about 20% ..... 80

Money available to manufacture the car ..... $320

A 3200-lb car consists of 3000 lb of iron and its alloys, and 200 lb of non-iron including copper, upholstery, rubber and so forth. The 3000 lb of iron at $0.025 per lb costs $75. The non-iron averages $0.20 per lb or $40.

Total material cost ..... $115

This leaves $320 minus $115, or $205 to be spent on fabrication, which is not quite enough at present for this size car.

With a 2500 lb car, material cost is $93, which gives only 20% more available for fabrication – not enough.

Iron still gives greatest "cubic inches stiffness" to the car structures per dollar spent, being far ahead of aluminum, magnesium and plastics in this respect. Also, iron lends itself readily to high-production techniques.

The steady trend of body design, which will continue as though we had not been at war, is gradually to absorb all projections into the body. These include lamps, fenders, bumpers, running boards, visors, and spare tires.

For airplanes, and for large stationary power generation, jet and gas-turbine units

should be closely studied. At 300 mph a jet engine uses twice as much fuel as a conventional airplane engine, but at 500 mph the jet engine uses only half as much as fuel. These engines are simple, small and cheap, but not suitable for automobiles.

Miles per gallon of gasoline in the post-war car will continue gradually to increase as a result of higher compression ratio, freer engine breathing, better carburetion, easier rolling, streamlining, less engine friction and lower car weight.

Solid injection fuel pumps now cost $100, or twice as much as the engine, and would add only 10 to 12% to fuel economy. This amount of improvement could be made by better carburetion, manifolding and other related steps.

Cross-country super-highways will lead to much long-distance travel; but nearly all auto use is and will be within 50 miles of urban centers, and the automobile will therefore continue to be a start-and-stop vehicle easily handled in city traffic.

Hydraulics appeal strongly to Americans, so more hydraulic devices will appear on cars, even though, as in the case of shock absorbers, a mechanical device may serve better. Electric drive is far too heavy in weight to be practical.



## . . . AIR TERMINAL Must Serve Economy And Transport Need

by E. J. FOU
American Airlines, I

▪ New England, Oct.

(*Excerpts from paper entitled "Planning Post-War Air Transportation"*)

THE airport is properly a first point of consideration in air transport planning, it must physically precede the post-war predicted extension of scheduled airline ser There are three points which should be sidered regarding airports:

1. Each community must make its air facility the best commensurate with est lished need, which is the sound econo basis for air transport growth.

2. We should provide for the expan of the airport and all facilities – the in design concept must reflect foresight long-range prediction; all necessary pre tive measures to assure practicability of pansion must be taken at the outset; and actual construction should proceed in log stages synchronized with traffic developme

3. The airport must represent a defi selling point for air service as well as faci necessary to it.

Among the developments in aircraft wh will have an effect on air transporta planning is the helicopter. However, it m await considerable improvement before utility in routine operation can be expec

Equally as spectacular is the jet pla which substitutes high pressure jets of ga for the conventional thrusting propeller a engine combination. Indications are t high fuel consumption and superspeed nec sary for efficient operation may postpone commercial usefulness for some time, b irrespective of its transport potentiality, will have done its share by a significant co tribution to the war.

Though the transport airplane of the ea post-war period will externally correspo to present types, its interior arrangeme will make possible all-purpose transp operation. A special feature is flexibili that is, the variation of the number of pa sengers and quantity of cargo is reac possible. This convertibility is achiev through the use of quickly removable pa senger seats and a movable bulkhead t extending the cargo space throughout th portion of the cabin not needed for passe gers. A closure is always present betwe passengers and cargo, keeping an orde appearance in the passenger segment.

Recently, a market survey was conduct by American Airlines to ascertain the a traveling public's ideas on post-war air tra portation. A total of 1,378,434 written re actions were received, and 84% of this tre felt that size of aircraft made no differen to them whatsoever. Rather, they seemed prefer such service improvements as th pressurized cabin which permits passeng independence of altitude and individu radios for passengers' use. The survey al confirmed the fact that speed more than an other single factor draws travelers to a transportation.

The public voted down the idea of selling ets without reservations, 71% saying reservations should be a part of services, spective of length. Also, 69% of the rs indicated a preference for checking ut the lightest pieces of luggage, instead having the luggage in the cabin at close nd. This expresses a desire to be relieved he bother and responsibilities of handling. our out of five of the air travelers polled d for the strategically-located regional ort against the separate local airport.

We believe the dawn of the era of freight nsportation by air is now upon us, and have already instituted a new air freight ice which is in operation between Boston 42 other cities on our system. This ser- is designed for greatest effectiveness distances of 450 miles or more, and on ments of 25 lb minimum.

## XCHANGE OF TOOLS ND OF TECHNIQUES PEEDS WAR OUTPUT

**by J. N. FOSTER**
**Curtiss-Wright Corp.**

**1944 National West Coast Aeronautic Meeting**

*Excerpts from paper entitled "Application of High-Production Methods to Reduced Production")*

WITH the advent of war in the European countries, the United States was immediately besieged with requests from foreign governments to determine the ability of the American aircraft industry to produce aircraft at a greatly accelerated rate of production. This called for the immediate adoption and subsequent procurement of available high-speed production machinery and equipment. This also necessitated the development by aircraft industries of special-ized machinery peculiar to the manufacture of aircraft alone.

There has, however, been a vast interchange of knowledge between the automobile and airplane industries; the latter industry has taken up the assembly line idea and adapted it to its own advantage in the fabrication of various subassemblies and in the final assembly of the finished airplane. This technique has made possible a cutdown in the training time of workers who are trained to do a particular job at an assigned station. It has made the worker a specialist at his job, and this has been reflected in higher quality work.

The improved technique in making zinc and kirksite dies, used on various types of hammers and presses, has been one of the outstanding contributions by the aircraft industry to the war effort.

We have been very successful in the adaptation of the heli-arc welding process, an example of which is the fuel tank currently being used in the Curtiss C-46 airplane by the incorporation of spot welding, heli-arc and plain welding. These tanks have no rivets through the outer shell, and are stronger and lighter as compared to the former riveted type we used.

There is no analogy in the manufacture of an automobile or tractor to an airplane. One of the major requisites of good airplane design is that the highest possible weight strength ratio be maintained.

The airplane is subjected to greater momentary load factors far in excess of normal loading, due to speed and the media in which it operates. These conditions demand special light alloys with resultant manufacturing techniques not called for in any other form of transportation; mass production methods, as known in the automotive and kindred industries, are out of the question as applied to the airplane we know today.

We have installed in our plants great numbers of high-production machines to produce the many airplanes required by the military necessity. These machines, as automatic screw machines, multiple spindle drills, and some large turret lathes are set up to produce large quantities of identical pieces. The production cost of these articles is almost in direct proportion to the quantity manufactured; that is, it will cost as much to set up an automatic screw machine or similar piece of equipment to run 20, 30, 50 or 100 pieces required for any small production order, as it does to run several thousand of the same piece.

It is logical to assume that there must be a basic model, with only necessary minor variations, if we can hope to derive much benefit from our high-pressure production experience. Cost increase must be expected if it is necessary to manufacture and incorporate such changes as non-standard door openings, varied seating arrangements, and so forth. Customer changes of this type would soon place the manufacturer back in the position of supplying custom-built airplanes.

The Army and Navy have had their problems. Practically all the maintenance work has to be done in the open under all climatic conditions, often with a minimum of skilled men. Repairs and renewals of parts must be made at times with only the simplest tools available and as fast as possible. These conditions have caused numerous design changes which will be reflected in much lower-operating costs in our post-war airplane.

One of the things that is going to result in reduced operating costs is the degree of interchangeability that has been achieved. In the future, the operator can order certain parts – classed as interchangeable – with the assurance they will fit. This means less installation time, and conversely, more ship time in the air.

The entire aircraft industry is indebted to manufacturers of instruments and accessories developed and used during the war, and every phase of flying and maintenance has been affected by these improvements. Among the outstanding developments of the war, in its relation to air transport, is radar in conjunction with the improvements in radio. When the military necessity permits the installation of this equipment in our airliners, it will add much to the safety of our operations.

It is difficult for the manufacturer to generalize on flying costs per ton-mile or per passenger-mile. However, in building large Army transports and following these transports in their varied operations in all parts of the world, we have accumulated a vast knowledge of how to do things under conditions that could never be approximated in our peacetime flying. This knowledge will be incorporated in our post-war airplanes, and the result, we hope, will be lower flying costs, lower maintenance costs, and a consequent reduction in cost per ton- and per passenger-mile.



# CRUISING CONTROL CHARTS GUIDE AIR TRANSPORT PLANES


**by R. C. LOOMIS**
***Transcontinental & Western Air, Inc.***



▪ *1944 National West Coast Aeronautic Meeting*


*(Excerpts from paper entitled "Cruising Control of Transport Aircraft")*

CRUISING control charts are used for modern high-speed transport planes to obtain the maximum possible utilization out of the aircraft, and Fig. 1 is a typical chart presenting cruising control information in tabular form.

In order to obtain the most economical cruising conditions, engine speed should be selected not only from a consideration of engine efficiency, which calls for cruising at maximum bmep values, but should consider propeller efficiency as well. The following illustrates the effect of cruising at engine

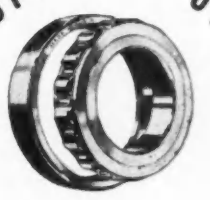

# SHOULDER TO SHOULDER
## for fifty-three years

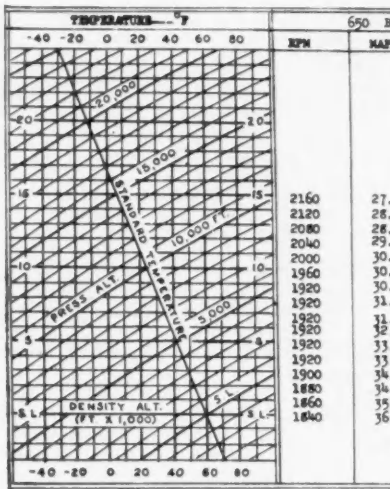
Shoulder to shoulder for over half a century, American Industry and Hyatt have worked together in the field of mechanical progress —solving ever and ever more complex engineering design problems and arriving at higher and higher precision and performance.

Today, we want to thank Industry for its generous understanding of Hyatt's wartime obligation of first serving our country. Also, we want to assure Industry that there will be compensations —for the Hyatt Roller Bearings of peacetime will reflect valuable lessons learned in the making of super-precision and super-serviceable Hyatt Roller Bearings for the tools and weapons of war.

So shoulder to shoulder, American Industry and Hyatt will continue to new heights of accomplishment. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey; Chicago; Detroit; Pittsburgh; Oakland, California.

DIVISION OF

**HYATT BEARINGS**  **GENERAL MOTORS**




| 650 BHP | | | 54,000–51,000# G.W. | | 51,000–48,000# G.W. | | 48,000–45,000# G.W. | |
|---|---|---|---|---|---|---|---|---|
| RPM | MAP | FPH | IAS | TAS | IAS | TAS | IAS | TAS |
| 2160 | 27.5 | 300 | 182 | 238 | 186 | 242 | 190 | 246 |
| 2120 | 28.0 | 300 | 184 | 237 | 188 | 240 | 192 | 244 |
| 2080 | 28.7 | 300 | 186 | 235 | 190 | 238 | 193 | 242 |
| 2040 | 29.5 | 300 | 188 | 233 | 192 | 236 | 194 | 240 |
| 2000 | 30.1 | 295 | 189 | 231 | 193 | 234 | 196 | 237 |
| 1960 | 30.9 | 295 | 191 | 229 | 194 | 232 | 197 | 235 |
| 1920 | 30.6 | 295 | 192 | 228 | 195 | 230 | 199 | 233 |
| 1920 | 31.2 | 295 | 194 | 227 | 197 | 228 | 200 | 230 |
| 1920 | 31.8 | 295 | 196 | 225 | 199 | 226 | 201 | 228 |
| 1920 | 32.4 | 295 | 198 | 223 | 200 | 224 | 202 | 226 |
| 1920 | 33.0 | 295 | 200 | 221 | 201 | 222 | 203 | 224 |
| 1920 | 33.6 | 295 | 201 | 219 | 202 | 221 | 204 | 223 |
| 1900 | 34.2 | 295 | 202 | 217 | 204 | 219 | 205 | 221 |
| 1880 | 34.8 | 295 | 203 | 215 | 205 | 217 | 206 | 219 |
| 1860 | 35.4 | 295 | 204 | 213 | 206 | 215 | 208 | 217 |
| 1840 | 36.0 | 295 | 205 | 211 | 207 | 213 | 209 | 215 |

CORRECT MANIFOLD PRESSURE 1 INCH HG. FOR EACH 20 °F DAT. ABOVE OR BELOW STANDARD

■ **Fig. 1 – Illustrates a 4-engine short-range cruising chart – auto-lean mixture. All essential data for constant horsepower cruising is contained on this chart, and only a glance is required to determine the proper engine settings and corresponding airspeeds at any altitude**

speed for maximum bmep values, but should consider propeller efficiency as well. The following example illustrates the effect of cruising at the engine speed for maximum $\eta/C$ versus the engine speed for minimum $C$, or specific fuel consumption, for a 4-engine transport aircraft:

| | | |
|---|---|---|
| Given: | Gross Weight, lb | 59,000 |
| | Cruising Altitude, ft | 4000 |
| | Cruising Power, bhp | 510 |
| | Speed for maximum $\eta/C$, rpm | 1600 |
| | Speed for minimum fuel consumption, rpm | 1450 |
| | $\eta$ for 1600 rpm | 0.855 |
| | $\eta$ for 1450 rpm | 0.832 |
| | $C$ for 1600 rpm, lb per bhp-hr | 0.450 |
| | $C$ for 1450 rpm, lb per bhp-hr | 0.445 |

$Thp_{1600} = 1742$; $V = 190$ mph; Fuel Consumption = 1.242 mpg

$Thp_{1450} = 1698$; $V = 186$ mph; Fuel Consumption = 1.232 mpg

For an airline which operates 1,000,000 miles a month, cruising at maximum $\eta/C$ would save about 7000 gal of fuel and increase payload potential by 42,000 lb for the fleet. This illustrates the overall value of small individual savings for a big operation.

Maximum miles per gallon of fuel is obtained if all climbs are conducted at the maximum rate of climb speed using the maximum allowable power with auto-lean mixtures. Often, however, engines will not cool properly when such a procedure is used. If so, it is often the practice to cool the engine with fuel by increasing the mixture strength to auto-rich. If this becomes necessary, minimum fuel consumption is then obtained by climbing at the maximum rate of climb speed or at the lowest air speed at which the engines will cool properly, using sufficient power to obtain a satisfactory rate of climb, usually 75% of "meto" power.

Air-speed indicator readings must be corrected for position error and compressibility effects to obtain the calibrated air speed. This calibrated air speed must then be divided by $\sigma^{\frac{1}{2}}$ (where $\sigma$ = air density at altitude/air density at standard sea level) to obtain the true velocity of the airplane through the air. Air temperature thermometer readings should also be corrected for compressibility effects before they are used to determine density altitude or true speeds.

When considering very long-range flights, it will be necessary always to fly at the optimum air speed for maximum range. For intermediate ranges, some compromise can be made in the interest of simplicity of flight planning.

Two types of standard cruising procedure have been used extensively for medium long-range flights. First, cruising at a constant indicated air speed for all gross weights and altitudes has the advantage of simplifying navigation procedures as well as reducing trip time considerably. The air speed selected is the minimum usable air speed at the maximum allowable take-off gross weight. Second, the procedure is always to fly at the optimum air speed for a given headwind, the headwind selected being one which will allow 95% of schedules to be completed if no flights are operated against a greater headwind.

Flight planning becomes a simple arithmetic analysis once the proper cruising altitude has been chosen, the choice of which is almost entirely a function of weather conditions enroute. For long-range operations, the best altitude is the one which allows maximum total miles per gallon, whereas for short-range operations, the best altitude is the one which allows maximum block-to-block miles per hour. Variables which must be considered are: wind at altitude, time to climb to altitude, time to descend from altitude, and cruising speed at altitude.

Many calculations have been made for typical airplanes which show that if cruising power is maintained during the descent, then the sum of the times for climb and descent is equivalent within 5% to the time required to travel the same distance at cruising speed. If such an assumption is made, then it is only necessary to consider cruising speed, wind, and fuel consumption in the climb and cruise for an analysis of the optimum altitude problem.

### Factors Affecting Cruising Power

These factors, which must be considered by the flight crew and the airline operations department when excess power is required for a particular flight or airplane, follow:

1. Effect of gross weight on power required. Flight crews should recognize this effect and check their gross weight calculations carefully before reporting that a particular aircraft requires more than chart power to maintain air speed.

2. Effect of power setting.

a. Temperature effects – If engines are not equipped with torquemeters, power is normally set by maintaining manifold pressure for optimum engine speeds, according to a chart similar to Fig. 1. The manifold pressures given must be corrected for temperature if the atmospheric conditions differ from standard.

b. Water vapor pressure effects – When the aircraft is flying through rain or in a moist atmosphere, an additional correction to the manifold pressure should be applied to account for power loss. The only satisfactory way to correct for the combined effect of temperature and moisture is by means of a torquemeter.

c. Ram air pressure effects – As the air speed of the aircraft increases, the full throttle manifold pressure increases. When flight is conducted with full throttle, the chart manifold pressure will not be available if the cruising air speed indicated on the chart is not first attained.

3. Effect of weather on power required.

a. Turbulence – When flying through turbulent air conditions, aircraft cruising speed is reduced. Unless a persistent downdraft is being encountered, however, this speed reduction is probably due to the pilot's efforts to maintain a constant altitude, with consequent changes in attitude of the aircraft. If the pilot will maintain constant air speed, the flight altitude will vary, but not excessively, and the range of the aircraft will be increased.

b. Icing – The only satisfactory solution to the ice problem is to seek a new level where icing does not exist.

4. Effect of cg position on power required. Numerous flight checks have shown that physically the difference in drag due to elevator position is negligible when considering even the most extreme cg ranges of conventional aircraft. However, when unstable aircraft are flown near the minimum power required speed, it is difficult to maintain a constant air speed.

5. Effect of parasite drag items on power required. One of the most consistent causes of loss of air speed is the change in parasite drag of the airplane. As wing loadings increase and as parasite drag is reduced to a very low value on modern high-speed transports, the relative effect of small items added in the airstream is greater than before, and therefore must be watched even more closely to prevent uneconomical speed losses.


# carbon plugging licked!

## Streamlined Design Eliminates Carbon-Catching Corners

Carbon looks constantly for corners in which to lodge. Oil flows freely when channels are smooth and unrestricted. To prevent carbon-plugging of the oil-drain passages, carbon accumulations must be prevented—free flow of oil assured!

These objectives are attained to an unprecedented degree in the Muskegon Type WCG oil ring. The big, wide, rounded-end slots and the wedge-shaped channel contour leave no sharp corners for carbon and sludge accumulations—furnish unrestricted passage for oil return to the crank-case.

Other important features: top and bottom lands are reduced by radius annular grooves to increase unit pressure for quick seating and immediately effective oil-control; rounded-end slots strengthen bridges over ventilations; available with Muskegon Graphitox coating.

Type WCG may be used as a snap ring, or supported with a steel expander or as a spacer member for expander type rings employing steel rails. It is suitable, in properly engineered combination, for all types of gasoline and Diesel engines.

There is a Muskegon ring type for every piston ring purpose. Consult Muskegon engineers freely and without obligation.

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PLANTS AT MUSKEGON AND SPARTA

# Battery Design Improvements Aid Winter Starting of Engines

**▪ Philadelphia, Nov. 8**

*(Summary of a paper on Cranking the Engine by H. C. Riggs, engineer, Electric Storage Battery Co., Philadelphia)*

A BATTERY is quite human in many respects. It requires an occasional drink – only it must be of relatively pure water; it needs food in the form of charging; it doesn't need a Saturday night bath, but an occasional cleaning with ammonia or sodium bicarbonate is helpful; its blood pressure can be taken with a voltmeter or a hydrometer and its condition ascertained by a little exercise in the form of a test discharge; when it is sick it generally responds to medicine prescribed by a competent physician, but it is useless to give it patent medicine of any kind; and it doesn't like cold weather any more than we do.

In short, give your battery a little care and you will be more than repaid, advises H. C. Riggs, Electric Storage Battery Co., who gave a talk entitled "Cranking the Engine," before the Philadelphia Section on November 8, 1944.

### Factors in Choosing a Battery

A battery is frequently chosen only according to its ampere-hours capacity. Other factors should be considered, too, Mr Riggs said, for different kinds of internal construction give different discharge characteristics. For instance, if a long cranking time is desired at 0 F, a certain battery may be the proper one, but if the particular engine requires a high minimum cranking speed for firing, another battery giving this speed may be necessary.

In selecting a battery for a specific engine, the author stated that it is advantageous to have three curves available for each of the batteries under consideration:

1. Variation in the 5-sec voltage with various rates of discharge at three temperatures: 80 F, 32 F, and 0 F.

2. Variation in discharge time or cranking time with various rates of discharge for the same three temperatures.

3. Variation during any given discharge as voltage falls off during the discharge to a value that represents the minimum voltage that can be tolerated for minimum firing speed.

It might also be remembered that if an engine is cranked intermittently for, say, 30 sec at a time, with 2-min rest periods in between, an increase in total cranking time of as much as 14% may be obtained, depending on such variables as the condition of the battery and its temperature.

The problem of cranking an engine also involves the starting motor and its characteristics. Fig. 1 shows a very satisfactory method of plotting starting-motor data. The constant-speed lines are plotted with motor volts as an ordinate and amperes as the abscissa. This type of curve enables an accurate determination of speed for any required torque and resulting voltage from the battery. It should be noted that the battery characteristics are also plotted on the same curve sheet. The full performance of the motor, therefore, can be studied with any battery and the optimum performance of the motor and battery obtained.

Finally, the characteristics of the engine itself must be considered, especially the variation of lubricating oil viscosity with temperature. In general, viscosity should be limited to 50,000 sec. Saybolt. Starts, Mr. Riggs stated, can be obtained at higher viscosities, but results are very inconsistent.

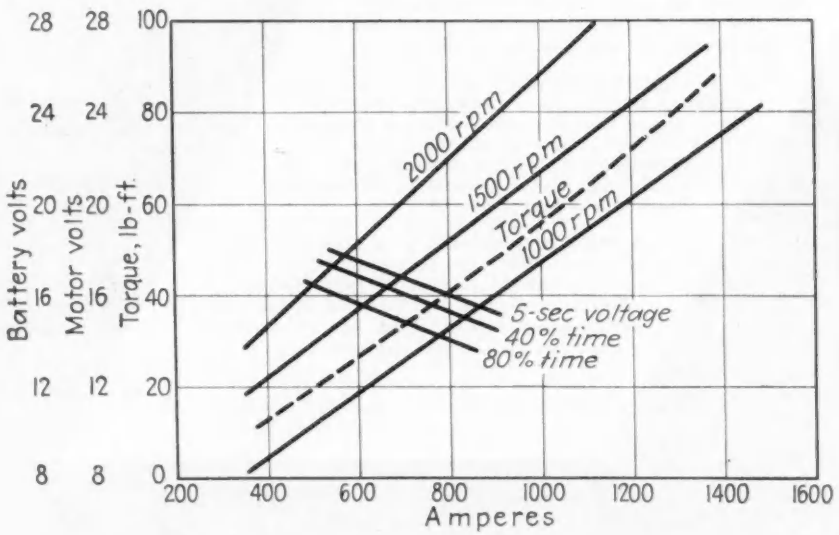
### Cold Room Tests Necessary

To arrive at a satisfactory team with the starting motor and the battery both doing an optimum of work, it is absolutely necessary to run cold tests on the engine in question, for, naturally, piston material and bearing tolerances, together with accessory loads, all become important factors. In a cold-room test it is also very important to obtain the minimum firing speed at each temperature with the lubricating oil to be used by the operator in actual service.

Having obtained the cranking torque at minimum firing speed for the oil to be used from cold-room tests, one can refer to the starting-motor curve shown in Fig. 1. Suppose, for example, an engine required a minimum speed of 100 rpm and 400 ft-lb of torque. If the gear ratio between the flywheel and the starting-motor pinion is 10 to 1, this would mean that the starting motor would have to develop 1000 rpm and 40 ft-lb of torque. From the curve we see that the battery will have to supply 800 amp at an end voltage at the end of the discharge of at least 14½ v plus whatever voltage is necessary for line drop in the battery leads and the starting switch. Reference to battery curves enables us to plot on this starting-motor curve a voltage-ampere battery relation, and the performance of any selected battery can, therefore, be analyzed to show the cranking-speed variation during the cranking period.

For short cranking periods, the rolling torque, or battery amperes, remains constant, but for long cranking periods, such as may be encountered in diesel-engine cranking, the rolling torque gradually tapers off, and it is necessary to make an allowance for this tapered torque. If exact comparisons are to be made, this can easily be accomplished using percentage of discharged curves, for it is possible to transfer from one curve to another at various currents.

The above discussion assumes that a commercially available starting motor is being used and that the volume of business does not warrant the complete new design of a starting motor. When a large volume of business is contemplated it is recommended by the author that the starting motor and the battery be designed as a team, for a much better overall performance can thereby be obtained. The selection of the proper battery and starting motor for an engine pays, for it has frequently been observed that by changing the starting motor to a different type, a battery of approximately one-half the size originally planned upon can be used.




▪ Fig. 1 – Starting-motor characteristics. Constant-speed lines are plotted with motor volts as an ordinate and amperes as the abscissa. This type of curve enables an accurate determination of speed for any required torque and resulting voltage from the battery

# BELL TELEPHONE LABORATORIES

***Exploring and inventing, devising and perfecting for our Armed Forces at war and for continued improvements and economies in your telephone service***

RESEARCH, in the Bell Telephone System, has always been an expanding activity, growing with the scientific knowledge of the times and contributing to that knowledge. Upon it have been based important inventions and developments.

The telephone, itself, was invented in the laboratory where Alexander Graham Bell was carrying on researches in speech and hearing and laying the foundation for the electrical transmission of speech. As time went on the telephone research program expanded to cover every science which gives any promise of improved telephony and every engineering art which applies to the development, construction, installation and operation of telephone facilities.

These researches and development studies now cover electrical communication of speech—both by wire and by radio—the transmission of pictures (television)—and many important projects for war.

### *There Is No End to Progress*

Every new research gives rise to new inventions and to new lines for development and design. New inventions indicate new lines for more research. Research and development work, invention and design go hand in hand. In the early years, this work was carried in part by the American Telephone and Telegraph Company and in part by the Western Electric Company, the manufacturing unit of the Bell System.

For many years, however, this work has been assigned to a specialized unit, Bell Telephone Laboratories, Incorporated. Theirs is the responsibility for the technical future of the industry. They carry their developments from the first faint glimmerings which basic researches disclose to the final design of equipment and the preparation of specifications for its manufacture. And after manufacture and installation, they follow their products in operation; and continue development work to devise still more perfect equipment, less expensive, more convenient and of longer useful life.

These policies and procedures of Bell Telephone Laboratories are distinguished by two characteristics. In the first place the Laboratories design for service. The consideration is not the profit of a manufacturer through first sales and replacement models but the production of equipment which will give the best service at the lowest annual cost when all factors are considered, such as first cost, maintenance, operation, and obsolescence. The Laboratories make no profit and the equipment they design is owned and used by the telephone companies; and the emphasis is upon that use.

### *Organized Co-ordinated Research*

In the second place the Laboratories design always with reference to the complete communication system in which the particular equipment is to play a part.

Reliable, economical telephone service, which is the product of its efforts, is not so much an assemblage of excellent apparatus as it is an excellent assembly of co-ordinated equipment—all designed to work together reliably and economically for a larger purpose.

It is not enough that Bell Laboratories shall design a new piece of electronic equipment which has merit or a new cable or telephone receiver. They must design with reference to all the other parts of the communication system so that the co-ordinated whole will give the best possible service.

### *4600 People in Bell Laboratories*

Bell Laboratories contributions to the Armed Forces derived in large part from the technical background that the Laboratories had acquired through their steadily maintained program of research. The Laboratories had special knowledge, skill and techniques which could instantly be diverted to war problems.

At the time of Pearl Harbor, over a quarter of the 4600 people in the Laboratories had twenty or more years of service. This breadth of background made possible many engineering developments outside the strict field of communication and these have been of value to the Armed Forces. So far the Armed Forces and the O.S.R.D. have engaged the Laboratories on over a thousand major projects. The majority of these assignments have been completed; and have contributed to our victories on many fronts.

Most of the Laboratories developments, of course, have been in the field of electrical communication. Communication, not simply between individuals as in ordinary telephony but between mechanisms—as in the electrical gun director. The Laboratories techniques and electronic researches have produced many secret weapons for our country's Armed Forces.

### *Leader in Electronic Development*

For those problems the Laboratories had a remarkable background of experiences in research and development. In World War I, they pioneered by developing radio telephone systems for talking between planes and between planes and ground stations. They also contributed methods and devices for locating enemy planes, submarines, and artillery.

In this war, Bell Laboratories have pioneered in the field of electronics. The Western Electric Company, which manufactures the designs of the Laboratories, is the largest producer of electronic and other war communication equipment in the United States and is now engaged almost exclusively in the manufacture of this equipment.

In war, Bell Telephone Laboratories devote their work to the needs of our Armed Forces. In peace, they are constantly exploring and inventing, devising and perfecting for continued improvements and economies in telephone service. Centralized research is one of the reasons this country has always had "the most telephone service and the best at the least cost to the public."

BELL TELEPHONE LABORATORIES